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Personality characteristics in patients with chronic fatigue syndrome.

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PERSONALITY CHARACTERISTICS IN PATIENTS WITH CHRONIC FATIGUE SYNDROME

by

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ABSTRACT

Personality characteristics of 26 females and 7 males with Chronic Fatigue Syndrome (CFS) were assessed using the Minnesota Multiphasic Personality Inventory-2 (MMPI-2). Participants were recruited through local physicians and support groups. The average MMPI-2 profiles obtained for males and females in this study were compared to the average MMPI-2 profiles established for male and female CFS subjects in other studies (Miller Iger, 1992) using t-tests to determine if they were comparable. In addition, the relationship between fatigue severity and personality characteristics as measured by the MMPI-2 was investigated using both correlational methods and t-tests. MMPI-2 scores of high and low fatigue groups were compared to determine if there were any significant differences. Fatigue severity was assessed using a visual analogue scale, a Fatigue Questionnaire developed by Wessely and Powell (1989), and The Fatigue Severity Scale developed by Krupp, LaRocca, Muir-Nash, and Steinberg (1989). Group membership was determined using a median split method. Although the mean MMPI-2 scores for male and female

subjects in this study were significantly different from the established profiles on some scales, clinically significant elevations were found for the same basic clinical scales. With respect to the relationship between fatigue severity and personality characteristics, it was found that fatigue severity was positively correlated with scores on theoretically related MMPI-2 scales. In addition, high and low fatigue groups differed significantly on some MMPI-2 scales. This study supports the use of the MMPI-2 as an aid to the diagnosis of CFS as there is a unique profile for CFS sufferers that differs from that of depressed patients (Miller Iger, 1992).

DEDICATION

This paper is dedicated to all of those people suffering from CFS, in particular my parents, William and Carol Collier. There are no words to express how I feel watching you suffer from day to day with this disease. I can only hope that time will see you well again. In the meantime, keep up your hope, and know that there are people out there who believe in the existence of this disorder, and are working to find a treatment and a cure.

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CHAPTER I

INTRODUCTION

In the past few years, there has been increased interest in the investigation of a disease known as Chronic Fatigue Syndrome (CFS). This disease has come to be known by many different labels, including Myalgic Encephalomyelitis (ME), Post-Viral Fatigue Syndrome (PVFS), and Epidemic Neuromyasthenia (ENM). As a result, CFS has been dubbed "The Disease of a Thousand Names" (Parish, Bell, Hyde, & Rubinstein, 1992). In the interest of brevity, all of the above noted labels will be subsumed under the term Chronic Fatigue Syndrome (CFS).

CFS is characterized by many symptoms, among which are: unexplained debilitating fatigue sufficient to impair functioning to less than 50% of normal levels, muscle aches, muscle weakness, mild fever, sore throat, headaches, sleep disturbances, and a variety of other physical symptoms. Typically, patients who have CFS also experience neuropsychological symptoms such as forgetfulness, excessive irritability, confusion,

difficulty thinking, and inability to concentrate, resulting in mental fatigue (Holmes et al., 1988). In addition, psychological symptoms such as emotional lability, anxiety, depression, social withdrawal, and changes in personality have been noted (Stricklin, Sewell, & Austad, 1990). A unique feature of CFS is the extreme effect that any kind of mental or physical effort has on the experienced symptoms. Even minor tasks such as solving simple problems or going for a walk can exacerbate the physical symptoms in some individuals so that they are incapacitated for days (Calabrese, Danao Camara, & Wilke, 1992; Wood, Bentall, Gopfert, & Edwards, 1991). What is not yet clear is whether this increased fatigue affects mood and personality in patients with CFS, for example, by resulting in increased depression and irritation.

CFS and Depression

There is much debate over whether CFS is a disease in its own right, or whether it is a form of other diseases, such as muscle disease, somatoform disorders, anxiety disorders, or major depression (Dutton, 1992; Hickie, Lloyd, & Parker, 1990; Katon & Russo, 1992; Lane, Manu, & Matthews, 1991). There is a high degree of symptom overlap between major depression and CFS, making it very difficult to distinguish between the two syndromes (David, 1991; Dutton, 1992; Ray, 1991). For example, both major

depressive episode (MDE) as defined in the American Psychiatric Association's (APA's) Diagnostic and Statistical Manual III-Revised (DSM III-R: APA, 1987), and CFS as defined by the Centre for Disease Control (Holmes et al., 1988) have as symptoms fatigue or loss of energy nearly every day, insomnia or hypersomnia nearly every day, and diminished ability to think or concentrate. According to Dutton (1992), studies to date have operated on the premise that CFS and major depression occur comorbidly and are etiologically linked. Specifically, Dutton (1992) states that investigators have presumed that:

> patients with premorbid depression have immunosuppression as a result of the depression, have a...neurologic weakness from which both depression and chronic fatigue syndrome arise, or have a tendency to somatize psychological problems and the chronic fatigue syndrome represents another manifestation of that somatization (Dutton, 1992, p. 493)

In his recent review of CFS articles, Dutton (1992) pointed out that there is no conclusive evidence for inflated rates of premorbid depression in persons with CFS. Thus, it cannot be concluded that CFS is a form of depression. In studies investigating the incidence of current psychiatric disorder in CFS patients, some have

found higher rates of psychiatric disorder, particularly major depression (Krupp et al., 1991; Ray, Weir, Cullen & Phillips, 1992), whereas others have not (Hickie et al., 1990; Lane et al., 1991). There remains, therefore, the possibility that CFS and major depression can occur comorbidly, and researchers continue to explore the differences and similarities between these two diseases.

Ray (1991) pointed out that chronic illnesses are particularly likely to result in an affective disorder. Chronically ill patients will likely have decreased their exercise and social activities to such a degree that they no longer receive the positive reinforcement that these activities bring. As Ray (1991) noted, there is a relationship between physical activity and emotional stability; lack of social and physical activity is likely to "sow the seeds of disengagement and depression" in chronically ill patients (p.3). There is evidence that patients with CFS experience depression more often than normal controls (Blakely et al., 1991), and more often than patients with similar chronic diseases such as multiple sclerosis, systemic lupus erythematosus, and Lyme disease (Krupp et al., 1991; Ray et al., 1992; Wessely & Powell, 1989). Depression in such studies was typically assessed using either the Beck Depression Inventory (BDI: Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), or the General Health Questionnaire (GHQ-28: Goldberg & Hillier,

1979). In addition to the physical fatigue, the persistent mental fatigue experienced by CFS sufferers is associated with depressed mood (Grafman, Johnson, & Scheffers, 1991). Thus, it is possible that CFS patients are experiencing mild depression, if not a major depression in addition to CFS.

Diagnosis of CFS

At the present time, the diagnostic criteria for CFS as outlined by the Centre for Disease Control (CDC: Holmes et al., 1988) rest on the fulfilment of physical criteria, and require that psychiatric diseases such as Major Depressive Disorder (MDD) be ruled out before a diagnosis can be made (Dutton, 1992). These CDC criteria are now the accepted standard for scientific papers and medical legal purposes (The Nightingale Research Foundation, 1992). (For complete criteria, please see Appendix A). It has not yet been established whether psychological symptoms and subjective complaints of disrupted cognitive functioning can be used to aid in this diagnosis, although such complaints are well-documented (Lane et al., 1991; Stricklin et al., 1990). Given the similarity between major depression and CFS with respect to their physical symptoms, it is possible that this reliance on physical criteria results in misdiagnosis in some cases. A patient who is diagnosed as having MDD automatically cannot

receive a diagnosis of CFS, even though s/he may be suffering from both disorders.

In the search for a diagnosis, patients with CFS are often subjected to an extensive medical examination by a general practitioner (GP) as well as several specialists in an effort to discover a cause for their symptoms. As there is not yet a medical test for CFS, a medical diagnosis accounting for all symptoms is usually not found. As a result, patients are then usually sent to psychiatrists and/or psychologists with the assumption that their illness is psychological, and not medical. Some of these patients are told that there is nothing psychologically wrong with them, and are sent back to their G.P.'s to undergo further tests. Others are diagnosed as being depressed, and prescribed anti-depressants, which can relieve some, but not all, of their symptoms. What results is an unending search for a diagnosis, and frustration, both for the patients and for the doctors who are trying to diagnose them. The CDC diagnostic criteria for CFS add to this frustration by not allowing for the diagnosis of both CFS and MDD in the same patient.

Before the CDC diagnostic criteria for CFS can be changed, however, there needs to be a way to help differentiate patients with CFS from those with depression on the basis of something more than physical criteria.

There is a need for research to explore the utility of psychological assessment instruments which would help to differentiate people suffering from depression from those suffering from CFS on the basis of psychological factors, if possible. Such a test might also help identify those people who are suffering from both CFS and depression. For example, if CFS patients can be distinguished from depressed patients on certain psychological factors, then a patient with both disorders should have both the CFS and depressed characteristics. While not conclusive, this would be a hint to psychologists and psychiatrists that the patient might be suffering from more than just MDD.

To date, psychological assessment instruments have been used in many studies to evaluate the incidence of psychiatric disorder in CFS patients and to explore the etiology of the disease. David (1991) provides a comprehensive summary of the various studies and the assessment instruments used in each. Some of the instruments commonly used include: the BDI (Beck et al., 1961), the Profile of Mood States (POMS: McNair, Lorr, & Droppleman, 1971), and the Diagnostic Interview Schedule (DIS: Robins, Helzer, Croughan, Williams, & Spitzer, 1981). Unfortunately, these studies simply recorded the incidence of disorders such as MDD in patients with CFS, and did not use the psychological instruments to differentiate CFS from other disorders. The result was

that these studies pointed out the comorbidity that can occur. There was no discussion of whether the depression had preceded CFS, or vice versa, and the question of whether one disorder caused the other was not addressed. Thus, these studies did not provide any insight into the etiology of CFS, nor did they provide any way to help diagnose CFS as opposed to other disorders. Linking CFS with depression makes distinguishing the former more difficult, especially as the diagnosis of depression precludes the diagnosis of CFS.

CFS and the MMPI

In 1990, Dr. Linda Iger (aka Dr. Linda Miller Iger) investigated the personality characteristics of a group of CFS patients utilizing the Minnesota Multiphasic Personality Inventory (MMPI: Hathaway & McKinley, 1940). The MMPI is a 550 item, self-report personality inventory which requires people to answer true or false to a variety of statements. The scale items are organized into 4 validity and 10 basic clinical scales, as well as a variety of research scales. The descriptions of the validity scales are as follows: Scale ? (Cannot Say)- the number of items that are not answered; Scale L (Lie)- high scores indicate a socially desirable response tendency; that is, people respond the way they think an ideal person would respond; Scale F (Infrequency)- high scores can

indicate an exaggeration of symptom distress, a random answering style, or a misunderstanding of test items; Scale K (Correction, or Defensiveness)- very high scores can indicate high defensiveness, and "faking good", while very low scores can indicate poor defenses, and "faking bad". It is important to note that these scales should be looked at in combination, rather than separately. For example, a high score on Scale F can mean symptom exaggeration, but it is unlikely that the subject is exaggerating enough to make the profile invalid if s/he also has a low score on Scale L and an average score on Scale K.

The descriptions of the 10 basic clinical scales on the MMPI (Hathaway & McKinley, 1940) are as follows: Scale 1 (Hypochondriasis)- preoccupation with bodily concerns and state of physical health; Scale 2 (Depression)- sad mood, feelings of discouragement, pessimism, hopelessness, hyper-responsibility, high personal standards, and intrapunitiveness; Scale 3 (Hysteria)- somatic complaints, and denial of physical health, psychological or emotional problems, and social anxiety; Scale 4 (Psychopathic Deviate)- negative attitudes towards family and social background, authority problems, and social alienation; Scale 5 (Masculinity/Femininity)- emotional reactions, interests, attitudes, and feelings about relationships usually associated with members of the opposite sex;

Scale 6 (Paranoia)- interpersonal sensitivity, suspicious attitudes, projected hostility, insecurity, and self-centredness; Scale 7 (Psychasthenia)- generalized anxiety and distress, high moral standards, self-blame, rigid impulse control, and obsessive personality traits; Scale 8 (Schizophrenia)- strange beliefs, unusual sensory experiences, confusion, difficulty concentrating, and special sensitivities such as emotional and social alienation; Scale 9 (Mania)- overactivity, impulsiveness, overambitiousness, high aspirations, and extroversion; Scale 0 (Social Introversion)- social shyness, social anxiety, and lack of social assertiveness. Descriptions of these scales were taken from work by Blakely et al. (1991) and The MMPI-2 Manual (Butcher, Dahlstrom, Graham, Tellegen, & Kraemmer, 1989b).

Raw scores on the MMPI scales are converted to T-scores with a mean of 50 and a standard deviation of 10, which can then be graphed to provide an MMPI profile. In such a profile, a T-score that is two standard deviations or more above the mean (70 or above) is considered clinically significant (Miller Iger, 1992). Iger (1990) notes that the MMPI has high reliability and validity, and is used frequently to screen pathology and help differentiate between diagnostic categories. Since its development, the use of the MMPI (Hathaway & McKinley, 1940) has spread to nonclinical settings, where it has

been used to screen prospective employees. One major reason for its popularity and wide-spread use is the presence of the validity scales, which answer the question: "How open and honest was this person in answering the items?".

In her study using the MMPI, Iger (1990) compared the average MMPI profile for CFS patients with "established, commonly used profiles for Hypochondriasis, Depression, Malingering, Chronic Illness, as well (as) the original MMPI normative group" (p. 462). She stated that it was important to compare the profiles from the various patient populations because several CFS patients were being labelled by their physicians and sent to psychologists and/or psychiatrists with these incorrect diagnoses. As previously noted, this is frustrating, both for the patient and the physician who is trying to treat him/her. Given that the MMPI is a reliable, valid screening device for differentiating between diagnostic categories on the basis of basic personality characteristics, Iger (1990) proposed that it would be a potential tool for differentiating between CFS and the other diseases with which it was being confused.

Iger (1990) found that CFS patients did, in fact, have a distinct MMPI profile. Patients showed clinically significant elevations (T-scores >70) on the following basic clinical scales: 1 (Hypochondriasis), 2

(Depression), 3 (Hysteria), 4 (Psychopathic Deviate), 7 (Psychasthenia), and 8 (Schizophrenia). A brief description of these scales can be found in Appendix B. This profile was consistent for both males and females, and was indicative of a person who was experiencing depression, tension, anxiety, social withdrawal, somatic discomfort, unhappiness, physical fatigue, feelings of hopelessness, confused thinking, and self-doubt. Since the profile differed from that of the other patient groups, including depressed patients, Iger (1990) concluded that the MMPI (Hathaway & McKinley, 1940) would be a useful diagnostic tool to help physicians and therapists differentiate between CFS and the other patient groups, especially those suffering from depression. According to Iger (1990), the typical MMPI profile for a person suffering from depression had a clinically significant elevation on Scale 2 (Depression) only. In contrast, the MMPI profile for the CFS sample had clinically significant elevations on Scales 1, 2, 3, 4, 7, and 8. While this profile did not rule out the possibility that a patient with CFS was depressed, the profile differed markedly from that of a person suffering from depression only, indicating that depression was not the only problem. It should be noted that the presence of a profile with clinically significant elevations on several scales for CFS patients does not necessarily mean

that these patients should be treated as mentally ill, rather than physically ill. This profile could contribute by serving as an aid to differential diagnosis for those clinicians who use it. The importance of using a psychological instrument to aid in diagnosis of CFS lies in the fact that it is often clinicians such as psychologists who misdiagnose CFS as depression because of symptom overlap. The use of a well-known psychological instrument to differentiate CFS from mental disorders such as depression would help the clinicians who use this tool to more accurately diagnose the patients with CFS who are referred to them for purposes of diagnosis.

Stricklin et al. (1990) found an MMPI profile for CFS patients that was similar to that found by Iger (1990). The average profile obtained for CFS patients in their study was significantly different from that of normal controls, with differences on Scales F (Validity), 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), 4 (Psychopathic Deviate), 7 (Psychasthenia), 8 (Schizophrenia), and 0 (Social Introversion). Clinically significant scale elevations (T>70) were found for the same basic clinical scales as in the Iger (1990) study, that is, Scales 1, 2, 3, 4, 7, and 8. This study provides further evidence that there is a definite pattern of psychological characteristics found to be common in CFS patients that can be identified using the MMPI (Hathaway &

McKinley, 1940). Stricklin et al. (1990) noted that there was a definite psychological pattern that could be found in patients with CFS using standard psychological measures such as the MMPI, and suggested that the MMPI and a stress test be used in conjunction with a medical screening test to establish a tentative diagnosis of CFS. (As noted by Stricklin et al. (1990), stress has been found to be a predisposing factor for CFS). They also noted, however, that further research was needed to determine whether this profile was typical of CFS patients, and whether it differed from that of other chronically ill patients.

Blakely et al. (1991) also used the MMPI (Hathaway & McKinley, 1940) to investigate personality characteristics in CFS patients. They compared the average MMPI profiles of CFS patients to those of normal controls and chronic pain sufferers to determine whether the average profiles of the two chronically ill populations were similar. The authors noted that one of the difficulties with using the MMPI to investigate the personality characteristics of chronically ill patients was that many of the items on the MMPI were sensitive to physical symptoms such as those experienced by CFS patients, thus contributing to the abnormal elevation of several MMPI scales. It was hoped that the use of a chronic pain (CP) control group would help determine if the elevated scores were attributable to the endorsement of items due to physical components of the

patients' state of ill health, or to stable personality traits, as the two patient groups were similar in that their illnesses were non-fatal, of uncertain duration, and had biological, psychological, and social manifestations. Blakely et al. (1991) were also interested in determining the extent to which CFS patients were homogeneous or heterogeneous with respect to their personality traits as measured by the MMPI.

Blakely et al., (1991) found that both CFS and CP patients had elevated personality profiles relative to normal controls, but that CFS patients showed significantly greater elevations than the CP group on the following MMPI scales: F (Validity), 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), 4 (Psychopathic Deviate), 7 (Psychasthenia), 8 (Schizophrenia), and 0 (Social Introversion). The most marked difference was found for Scales 7 and 8. The authors concluded that this difference could be attributable to the high levels of anxiety that CFS patients were experiencing, as increases in anxiety are usually reflected by increased elevations on Scales 7 and 8. While clinically significant (T>70) elevations for the CFS group were found only on Scales 1, 2, 3, and 8, the average MMPI profile obtained was similar to that found in Iger's (1990) and Stricklin et al.'s (1990) papers. Thus, from studies done to date, it appears that there is an MMPI profile common for CFS

patients. The authors concluded that the MMPI profile of CFS patients was not solely due to physical symptoms of the illness, as it differed from that of the chronically ill pain group. They suggested that the CFS profile could, in part, be attributed to common personality traits among CFS sufferers that were not present in other chronically ill patients groups. The authors could not, however, conclude whether the personality characteristics of the CFS patients as measured by the MMPI were the result of having CFS, or whether they were a predisposing factor in the development of CFS and were present before the subjects became ill.

More recently, Linda Miller Iger (1992) compared the MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kraemmer, 1989a) profiles of CFS patients with those of normal controls, as well as with the previously established MMPI profile of CFS patients (Iger, 1990). The MMPI-2 (Butcher et al., 1989a) is the revised version of the original MMPI (Hathaway & McKinley, 1940) that resulted from the need for restandardization of the norms. It was found that some of the items were outdated and needed to be reworded or replaced. In comparison to the original MMPI, the MMPI-2 has 567 items, which are organized into 4 validity scales, 10 basic clinical scales, and various research scales. The descriptions of the validity and basic scales remain the same, and can be found in Appendix B. Scoring

is also similar, with raw scores being converted to T-scores with a mean of 50 and a standard deviation of 10, and graphed on a profile. For the purposes of this paper, the major notable difference is the change in the value for clinical significance. Whereas clinical significance on the MMPI was reached at a T-score of 70 or above, clinical significance on the MMPI-2 is reached at a T-score of 65 or above.

In her 1992 study, Miller Iger found that female patients with CFS had clinically significant elevations on the same 6 basic clinical scales, that is, Scale 1 (Hypochondriasis), Scale 2 (Depression), Scale 3 (Hysteria), Scale 4 (Psychopathic Deviate), Scale 7 (Psychasthenia), and Scale 8 (Schizophrenia). Male CFS sufferers, however, did not have clinically significant scale elevations on Scale 4. Sample profiles from Miller Iger's study (1992) can be found in Appendix C. The CFS group still differed significantly from the normal control group on several of the MMPI-2 scales, and Miller Iger (1992) concluded that the MMPI-2 (Butcher et al., 1989a) was a useful tool for aiding in the diagnosis of CFS, and in the differentiation of CFS patients from other clinical groups. As noted by Stricklin et al. (1990), however, more research needs to done to determine if the MMPI-2 profile obtained in these studies is typical of other CFS patients.

Psychological Factors and Fatigue Severity

One of the characteristics of CFS is the tendency for its symptoms to fluctuate from day to day, and from week to week. Although this tendency has been well documented (Calabrese et al., 1992; Ray, 1991; Wood et al., 1991), little has been done in the way of research to determine if this waxing and waning of symptoms is related to the emotional state and personality characteristics of these people. Since fatigue is the main common symptom of all CFS sufferers, it is this symptom in particular that will be discussed.

The fluctuating nature of the fatigue in CFS patients could present a problem for diagnosis based on psychological instruments. It is possible that when CFS patients' fatigue is not as severe, they are in a much better mood, are less anxious, and appear more friendly than when their fatigue is more severe. This may translate into different scores on psychological tests, depending on how severely fatigued the individual is when taking the test. While the basic personality traits of the individual may remain the same, the state of the individual may affect how prominent these traits are. If an individual's scores on psychological tests are then compared to scores for other CFS patients found in previous studies, the state of the individual when taking the test may be important. For example, when a subject is

moderately to severely fatigued, his/her test score may coincide with those found for a group of CFS patients in a previous study, but when the subject is mildly fatigued (relatively speaking), his/her test score may not coincide with those of a group of CFS patients in a previous study, and the subject may not receive the diagnosis of CFS.

Specifically, the MMPI-2 (Butcher et al., 1989a) provides a profile of personality characteristics. Suppose a person with CFS was slightly concerned about his/her health, mildly anxious, and mildly depressed when his/her fatigue was not very severe, but was extremely concerned, anxious, and depressed when his/her fatigue was very severe. This would be reflected in his/her MMPI-2 profile such that Scale 1 (Hypochondriasis), Scale 2 (Depression), Scale 3 (Hysteria), and Scale 7 (Psychasthenia) would be slightly more elevated than the other scales, although still in the average range when the fatigue was not as severe, but that these scales would be elevated to clinical significance when the fatigue was very severe. The individual's overall personality traits would not have changed, but the prominence of them would have. This is important with a psychological instrument such as the MMPI-2 in which clinical significance is considered important and most indicative of psychopathology. A CFS patient experiencing low levels of fatigue severity at the time of testing may not receive

the diagnosis of CFS simply because s/he does not have clinically significant elevations on certain MMPI-2 scales. Given the possibility that the current state of the person may elevate his/her test scores to clinically significant levels, an examination of the relationship between severity of symptomatology (fatigue being the most prominent) and scores on such psychological tests warrants investigation. The reliability of the MMPI-2 profile for CFS patients should be determined so that CFS patients experiencing low fatigue severity at the time of testing who do not evidence the clinically significant elevations expected for the CFS population are not misdiagnosed as not having CFS.

Levels of fatigue have been shown to be associated with forms of psychological distress such as anxiety, anger, confusion, and nervousness (David, 1991; May & Kline, 1988; Reeves, Potempa, & Gallo, 1991; Smith Blesch et al., 1991; Wessely & Powell, 1989; Wood et al., 1991). This has been demonstrated in a number of different populations, including undergraduate students (David, 1991), women in the early stages of pregnancy (Reeves et al., 1991), patients with cancer (Smith Blesch et al., 1991), and neuromuscular and CFS patients (Wessely & Powell, 1989; Wood et al., 1991).

Ray et al. (1992) noted that negative affect was commonly found to correlate with fatigue, but that causal

relationships between them were difficult to establish. Subjects in the study by Ray et al. (1992) described a reciprocal relationship between fatigue and affect. The extreme nature of the fatigue in CFS may have lowered mood, as patients had little control over the events in their lives and could not deal with everyday life stressors without experiencing a certain amount of failure and stress. Their emotional vulnerability impeded their ability to cope with these everyday stressors, so that the less capable they were of effectively solving their problems, the more depressed they could become. Stress and negative emotions could in turn exacerbate the physical symptoms of CFS. Other studies have found similar results (Krupp et al., 1988; Krupp et al., 1991; Ray et al., 1992). In a study by Lane et al. (1991), the authors stated that they found no relationship between severity of fatigue and the presence of major depression. It is unclear, however, whether level of severity in this study referred specifically to fatigue, or to symptomatology in general. In addition, this study did not involve a correlation between levels of fatigue and depression, but rather looked at separate scores on measures of severity and depression to see if they were both elevated (Lane et al., 1991). Determination of the relationship between fatigue and depression would be

improved by assessing their degree of association across all levels of these variables using correlational methods.

Regardless of which exerts more influence on the other, it is likely that affect and the perception of fatigue severity are related. Even within the general population, diffuse symptoms of fatigue and muscle weakness, such as those experienced by CFS patients, were more strongly associated with decreased mood level than were specific symptoms such as muscle pain (Ray et al., 1992). It has been suggested that the use of a structured assessment instrument such as the MMPI-2 (Butcher et al., 1989a) would be useful to further examine the relationship between depression and fatigue in chronic illnesses such as multiple sclerosis and CFS (Krupp et al., 1991). Again, this brings to mind the question of the reliability of an MMPI-2 profile in a population such as CFS in which symptom fluctuation is common.

It must be stressed that it is difficult to determine whether the personality characteristics that are common in a group of CFS patients are stable personality traits, or personality states which result from having such a chronic illness. Thus, it cannot be concluded from this study and other studies which use the MMPI or MMPI-2 to establish a profile that is common for CFS patients that the patients had personality traits which resulted in the development of CFS, as the characteristics may be a reaction to the

physical symptoms of the illness. The utility of the MMPI and MMPI-2 profiles for CFS sufferers lies in their ability to aid in the differential diagnosis of this disorder. The profiles should not be used to identify people who could potentially develop CFS, as there is no basis for assuming that the personality characteristics associated with the MMPI and MMPI-2 profiles were present before the onset of CFS. In addition, these profiles should not be used to label people with CFS as suffering from a mental disorder, rather than a physical disorder. The profiles should be used to identify people who currently have CFS and differentiate them from people who suffer from depression only.

Several studies have investigated the effects of fatigue on people's mood states, as well as on anxiety levels. These studies used one of two methods to induce fatigue: they either deprived the subjects of sleep, or had the subjects do extreme amounts of exercise, such as run marathons. For example, a study by Cutler and Cohen (1979) looked at the effects of 24 hours of sleep deprivation (and therefore increased fatigue) on various mood states of normal subjects using a repeated measures design. Mood states were measured on the Multiple Affect Adjective Check List (MAACL), and the Profile of Mood States (POMS). According to Cutler and Cohen (1979), the MAACL has subscales which include Anxiety, Depression, and

Hostility, while the POMS has subscales which include Tension, Anger, Depression, Confusion, Fatigue, and Vigor. The authors found that there were significant increases on Hostility, Anxiety, Tension, Confusion, and Fatigue as a result of sleep deprivation.

Further evidence for the effect of sleep deprivation, and therefore fatigue, on psychological factors comes from a study by Mikulincer, Babkoff, Caspy, and Sing (1989). In their study, the authors found that increased fatigue due to sleep deprivation resulted in decreased overall mood. The authors noted that increased fatigue was associated with less inclination on the part of individuals to initiate and perform demanding tasks that would deplete the few resources they had available. Mikulincer et al. (1989) also cited evidence that increased fatigue led to increased irritation, tension, anxiety, and unhappiness.

Other studies which have looked at the effects of increased fatigue on psychological factors such as mood have used extreme exercise to induce a fatigued state. For example, a study by Tharion, Strowman, and Rauch (1988) looked at the effects of running a 50 or 100 mile ultramarathon on the mood of marathoners as measured by the POMS. The authors found that depression, fatigue, and confusion had increased from pre- to post-race. Another study by Steptoe and Cox (1988) found that high-intensity

exercise led to increases in tension, anxiety, and fatigue, as measured by the POMS. This study did not, however, include the anger and depression subscales of the POMS. In both of these studies, the researchers assumed that since the fatigue scores on the POMS increased after exercise, exercise-induced fatigue influenced psychological factors such as mood and anxiety. Thus, from the review of studies involving the experimental manipulation of fatigue, it appears that increased fatigue can bring about increases in certain psychological factors, such as depression, anxiety, and anger.

The ideal study to investigate personality characteristics in CFS patients across symptom severity would involve a within-subjects design, in which subjects would be required to repeat the assessment across varying levels of fatigue. There are some potential difficulties in using this design with a CFS population. For example, it is unlikely that CFS patients would be willing to fill out a questionnaire as lengthy as the MMPI-2 (Butcher et al., 1989a) when they were severely debilitated. Thus, it is possible that the differences in fatigue severity from assessment to assessment might be very small, since they would not reflect the state of the subjects under conditions of extremely high fatigue. In addition, if the subjects found that completing the MMPI-2 was too taxing the first time, they might be unwilling to complete it a

second time. It is likely that many subjects would not complete both conditions of such a repeated measures design study, since the rate of subject attrition would be even higher than what is typically seen with such designs. In addition, it makes sense to explore the possibility that there is a relationship between level of fatigue and scores on the MMPI-2 before doing an extensive within-subjects study. If a significant relationship was not found, then the utility of conducting a within-subjects investigation would be called into question.

Another way in which the potential relationship between fatigue and scores on MMPI-2 scales can be explored in CFS patients is to examine correlations between their scores on measures of fatigue, and their scores on the MMPI-2 scales. Given the fluctuating nature of the CFS symptoms, it is reasonable to assume that at any point in time different people are experiencing different levels of fatigue. It is possible that any heterogeneity on MMPI-2 profiles within a CFS subject population may be related to different levels of reported fatigue between different subjects. If such a relationship exists, then it is possible that the physical state that the CFS patients are in when they are assessed is reflected in their performance. For example, an individual's scores on the MMPI-2 may differ from a week when his/her physical symptoms are severely debilitating

to a week when the symptoms are not as severe. This is important to investigate because the MMPI-2 profile obtained by the individual would be compared to the MMPI-2 profile established for CFS patients in other studies (Miller Iger, 1992), which has clinically significant elevations on several scales. A person who has CFS, but whose symptoms are not extremely severe when s/he is tested, may be misdiagnosed as not having CFS if his/her profile does not have clinically significant elevations on the required scales.

The major difficulty with a correlational design such as the one described above is the fact that causal relationships between the variables cannot be established. For example, a person who has a significant positive correlation between fatigue severity and scores on MMPI-2 basic clinical scales 1 (Hypochondriasis), 2 (Depression), and 3 (Hysteria), which together measure Neuroticism, may simply be more aware of his/her symptoms, and may consequently be reporting more symptoms. Thus, the increased fatigue may result in higher elevations on the scales, or the person may be more sensitive to and aware of their somatic symptoms, and therefore report more symptomatology and higher levels of fatigue. A study by Levenson, Aldwin, Bosse, and Spiro (1988) found that patients high on emotionality, or neuroticism, were more likely to report more psychological symptoms. Thus, it is

very important to note that the use of a correlational method, rather than a repeated measures method, while more feasible with a CFS population, does not allow for the prediction of causal relationships among the variables studied.

Evidence that fatigue may be related to differences in personality characteristics comes from a study by May and Kline (1988). They showed that, in a group of British Army personnel, there was a correlation between subjective levels of fatigue and scales of the Eysenck Personality Questionnaire (EPQ: Eysenck & Eysenck, 1975). In particular, as fatigue increased, subjects tended to have significantly lower scores on the Extraversion scale, higher scores on the Neuroticism scale, and lower scores on the Lie scale (May & Kline, 1988). On the basis of these studies it can be hypothesized that fluctuations in fatigue may be related to fluctuations on scores of measures of personality characteristics as measured by other psychological instruments. Specifically, an increased level of fatigue is likely to be associated with increased scores on certain clinical scales of the MMPI-2 (Butcher et al., 1989a), such as Scales 1 (Hypochondriasis), 2 (Depression), and 3 (Hysteria), which together make up a measure of Neuroticism.

Measuring Fatigue

One of the difficulties with studies involving fatigue is the lack of a specific definition for what is meant by 'fatigue'. As David (1991) notes, fatigue can be both physical (lack of muscle strength), and mental (inability to concentrate, difficulty thinking, and memory lapses). The lack of a specific definition for fatigue translates into difficulty comparing studies which measure fatigue, as they may be measuring different constructs. In the studies mentioned above, fatigue was measured subjectively, using either visual analogue scales, or questionnaires which did not differentiate between physical and mental fatigue. A visual analogue scale requires that subjects indicate on a 100 mm line the place which best describes their present state of fatigue. One end of the line can be labelled "no fatigue", while the other can be labelled "severe fatigue". The distance that the subject's mark is from the "no fatigue" end of the line is then measured in millimetres. The questionnaires typically asked subjects to subjectively rate their general fatigue, such as feelings of tiredness. Thus, it is unclear what type of fatigue patients were referring to when they indicated the severity of their fatigue. A high rating on these scales could have indicated either high levels of physical fatigue, high levels of mental fatigue, or both, depending on how the subject defined fatigue.

A study by Wessely and Powell (1989) compared patients suffering from CFS with those suffering from neuromuscular and affective disorders using a questionnaire which looked at physical and mental fatigue separately to see if there was a difference between the two constructs. The authors were also interested in examining whether the different populations were experiencing different levels of mental and physical fatigue. Wessely and Powell (1989) found a close association between mental and physical fatigue, but they also found that the patient groups differed in the amount and type of fatigue that they reported. For example, CFS patients and depressed patients had high levels of both mental and physical fatigue, and neuromuscular patients had high levels of physical fatigue, and high levels of mental fatigue only when they also received a psychiatric diagnosis (Wessely & Powell, 1989). A study by Wood et al. (1991) found that high levels of mental fatigue were associated with psychiatric problems, particularly depression. Thus, it appears possible to experience mental and physical fatigue separately or together, and a study involving fatigue should include both measures of physical and mental fatigue.

The review of the literature indicated that there is a specific MMPI-2 profile for CFS patients which differs from that of other patients groups, such as depressed

patients. This profile is important because it can be used for purposes of differential diagnosis of CFS. A clinician who is having difficulty deciding whether a patient has CFS or depression could potentially use the MMPI-2 and compare the profile obtained by the patient with those typical for CFS and depressed patients. The review of the literature also suggests that it is important to determine if the MMPI-2 profile found in previous studies involving CFS patients is typical of other CFS patients.

The reliability of the CFS profile should also be established, as the symptoms of CFS patients, particularly fatigue, fluctuate from week to week. A review of studies investigating the relationship between severity of fatigue and personality characteristics, including mood states, indicated that increased fatigue was often associated with increased prominence of personality characteristics and mood states such as anxiety and depression. Studies which have experimentally manipulated severity of fatigue have also found that increased fatigue resulted in increased anxiety, depression, and anger. This calls to mind the question of whether an MMPI-2 profile for CFS patients is reliable across fluctuations of fatigue. The MMPI-2 profile of CFS patients who are not severely fatigued when they fill out the questionnaire may not correspond to the CFS profiles found in other studies, and the patients may

be misdiagnosed as not having CFS. In order to use the MMPI-2 as a tool for differential diagnosis, its reliability with a CFS population across different levels of fatigue must be established.

Purpose and Hypotheses

The main purpose of this study was to examine the average MMPI-2 profile of a group of CFS patients to determine if it was similar to that found in Miller Iger's study (1992), in order to replicate her findings. That is, an average MMPI-2 profile with clinically significant elevations (T>65) on the following basic clinical scales was expected for females: 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), 4 (Psychopathic Deviate), 7 (Psychasthenia), and 8 (Schizophrenia). An MMPI-2 profile with clinically significant elevations on Scales 1, 2, 3, 7, and 8 was expected for male participants. Samples of these profiles can be found in Appendix C. As previously stated, it is important to determine if patients with CFS have a distinct MMPI-2 profile in order to aid in differential diagnosis. CFS is often misdiagnosed as major depression due to symptom overlap, and the diagnosis of major depression precludes the diagnosis of CFS. The establishment of an MMPI-2 profile for CFS patients that is distinct from that of depressed patients would give an indication to clinicians using the instrument that the

individual may be suffering from more than just depression. Since the study by Miller Iger (1992) found that the CFS profile differed from that of other patient populations such as those suffering from depression, the present study represented an attempt to replicate her research in order to establish that this profile was typical of CFS patients other than those used in her study.

A further purpose of this study was to explore possible relationships between scores on the various MMPI-2 scales and reported fatigue severity. As previously stated, it is possible that an individual's scores on the MMPI-2 are related to the reported severity of his/her symptoms, particularly fatigue. This may be reflected in different scale elevations on the MMPI-2 such that individuals who are not as fatigued may have overall profiles similar to those found to be common in other CFS patients (elevations on Scales 1, 2, 3, 4, 7, and 8 for females, and Scales 1, 2, 3, 7, and 8 for males), but that are not elevated to clinically significant levels (T>65). Fatigue severity may be related to elevations on relevant MMPI-2 scales such that the scores of patients with CFS when they are not severely fatigued are not elevated to clinically significant levels; such patients may therefore be misdiagnosed as not having CFS. In contrast, CFS patients who are severely fatigued may have MMPI-2

profiles that are similar to those found for CFS patients in the Miller Iger (1992) study, with clinically significant elevations on the appropriate scales, and they may be properly diagnosed as having CFS.

The hypotheses of this study, then, were as follows:
1/ It was hypothesized that subjects' scores on the three fatigue measures would be significantly, positively correlated.
2/ The average MMPI-2 profile obtained by male and female subjects in this study was expected to coincide with the average profile obtained by male and female subjects in the study by Miller Iger (1992). Specifically, it was hypothesized that the MMPI-2 raw scores (with K included where appropriate) for subjects in this study would not be significantly different from the raw scores obtained by the subjects in Miller Iger's study (1992) on the following MMPI-2 basic clinical scales: 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), 4 (Psychopathic Deviate), 7 (Psychasthenia), and 8 (Schizophrenia). Separate profiles for male and female subjects were obtained because the raw scores on the MMPI-2 correspond to different T-scores for males and females. The averaging of scores for male and female participants to obtain a single profile would therefore not allow for the meaningful clinical interpretation of the profile. In addition, Miller Iger (1992) obtained

average profiles for male and female subjects separately; thus, any comparison of results obtained in the present study to those found by Miller Iger (1992) should involve separate profiles for the male and female participants.

3/ From the review of the literature, it seemed likely that increased severity of fatigue would be related to increased health concerns, depression, and anxiety. Therefore, it was expected that scores on the three measures of fatigue severity would each be significantly positively correlated with MMPI-2 basic clinical scales 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), and 7 (Psychasthenia).

4/ Given the presence of fatigue in patients with CFS, it was unlikely that they would report high energy levels. Specifically, it was expected that scores on the three fatigue measures would each be negatively correlated with patients' scores on MMPI-2 Scale 9 (Mania).

5/ To further determine how different levels of fatigue were related to different degrees of health concern, anxiety, and depression (as represented by MMPI-2 basic clinical scales 1, 2, 3, and 7), a comparison of high and low fatigue groups with respect to such concerns was done. Specifically, high and low fatigue groups were compared on each MMPI-2 scale separately to determine if there were significant differences between groups. Group membership was determined using a median split method, based on

scores on the three fatigue measures, and comparisons were done using t-tests. It was expected that participants in the high fatigue group would have higher scores on MMPI-2 Scales 1, 2, 3, and 7, and lower scores on Scale 9 as compared to participants in the low fatigue group.

CHAPTER II

METHOD

Participants

This study involved a group of patients who had been diagnosed with CFS. Participants were recruited primarily through a general practitioner who treats several CFS patients. Additional subjects were recruited from CFS support groups in Windsor and Essex County. Participation was on a voluntary basis. A total sample size of 36 was obtained. Three participants were excluded because their MMPI-2 questionnaires had questionable validity; this left a sample size of 33. Of the 33 people, 26 (79%) were women, and 7 (21%) were men. The mean age of the sample was 39.7 years, with ages ranging from 24.0 years to 60.0 years.

Given the difficulties surrounding the diagnosis of CFS, it was required that all participants meet the CDC Criteria for CFS (see Appendix A for complete criteria) (Holmes et al., 1988). Patients recruited through the support groups were asked if they had been formally diagnosed with CFS by a physician, and interviewed by the

researcher to see if they met the CDC criteria for CFS. Those who had not been diagnosed with CFS by a physician were not included in this study. Patients who had a history of major depression were not excluded from this study as has been recommended (Blakely et al., 1991; Grufferman, 1991., Lane et al., 1991), as it would have limited an already small sample size. Instead, a record of those patients who reported a history of depression was kept and their data were analyzed to determine whether they differed from CFS patients with no such history.

Measures

Minnesota Multiphasic Personality Inventory-2 (MMPI-2)

The MMPI-2 (Butcher et al., 1989a) is a 567 item, self-report personality inventory that requires subjects to answer true or false to a variety of statements. Items are organized into 4 validity scales, and 10 basic clinical scales, as well as a variety of research scales. A descriptions of the validity and basic clinical scales can be found in Appendix B. It is important to note that the validity scales should be looked at in combination, rather than separately. For example, a high score on Scale F can mean symptom exaggeration, but it is unlikely that the subject is exaggerating if s/he also has a low score on Scale L, and an average score on Scale K.

Only the first 370 questions of the MMPI-2 are necessary to get scores for the validity and basic scales, so only these questions were used for this study. The entire MMPI-2 was not used because of the possibility that completing it would be too tiring for the subjects. In addition, the MMPI-2 profiles for CFS patients as established by Miller Iger (1992) were based only on the basic scales of the MMPI-2, and thus required that only the first 370 questions be answered.

Raw scores on the MMPI-2 scales were converted to T-scores with an average of 50 and a standard deviation of 10, and plotted on a graph to provide a profile in keeping with the usual scoring and interpretation of the test. On such a profile, a T-score of 50 is considered average, while a T-score of 65 or over is considered clinically significant. As noted by Miller Iger (1992), both the MMPI and the MMPI-2 are highly reliable and valid personality instruments. The original MMPI basic clinical scales were developed by selecting those items from a group of 550 which differentiated between a patient population and normal controls. For example, in the development of Scale 1 (Hypochondriasis), those items which were answered differently by a group of hypochondriacal patients and a group of nonpatients to a statistically significant degree were chosen for inclusion in the scale (Butcher et al., 1989b). These items were

then cross validated on another group of hypochondriacal patients to demonstrate the validity of the scale. The other basic scales for the MMPI were developed in a similar manner, and therefore, all have high validity. This validity transfers to the MMPI-2, as the changes that were made to items on the MMPI for the MMPI-2 were minor, including the changing of sexist language, the modernization of idioms, grammatical clarifications, and simplification of wording. Butcher et al. (1989b) noted that a test-retest study by Ben-Porath and Butcher in 1988 compared a group of subjects who were administered the original and reworded MMPI items with a group of subjects who were administered the originally worded items twice, and found that there were no significant differences for most responses. Thus, the changes to the MMPI items for the MMPI-2 did not affect the validity of the scales.

Evidence for the reliability of the MMPI-2 also comes from Butcher et al. (1989b). Test-retest reliability was calculated for 82 males and 111 females, with an average retest interval of 8.58 days. Reported reliability coefficients ranged from .67 to .92 for men, and .58 to .91 for women for the validity and basic clinical scales of the MMPI-2 (Butcher et al., 1989b).

The MMPI-2 was the personality inventory of choice in the present study because of its widespread use and familiarity among clinicians, and its use in previous

studies involving CFS sufferers. Since personality characteristics were the focus of this research study, the use of mood measures such as the Beck Depression Inventory (BDI: Beck et al., 1961), or measures of symptom severity such as the Symptoms Checklist-90-R (SCL-90-R: Derogatis, 1983) would not have been beneficial.

Fatigue in this study was assessed using three scales: a visual analogue scale (VAS), the subjective questionnaire used by Wessely and Powell (1989), and the Fatigue Severity Scale (FSS) developed by Krupp et al. (1989). Three fatigue measures were used because each one differs as to the specificity with which it measures fatigue, and the way in which it asks subjects to rate their level of fatigue. For example, the VAS assesses general overall feelings of fatigue, that is, how tired the person is at the time of testing. (For an example of a VAS, please see Appendix D.) The FSS also measures global impairment, but it breaks down the impairment into nine items, and asks people about their level of agreement with various statements; thus, it is slightly more specific than the VAS. It is more concerned with the overall impact that fatigue has on everyday functioning. (For the complete FSS, please see Appendix E.) The fatigue questionnaire developed by Wessely and Powell (1989) is the most specific of the three fatigue measures, breaking down fatigue into physical and mental fatigue.

(For the complete questionnaire, please see Appendix F.) This scale asks subjects to rate their current levels of fatigue with respect to their usual levels of fatigue.

A further reason for having used three measures of fatigue was to assess the validity of the Wessely and Powell (1989) scale, as this had not yet been established. The validity of the VAS and the FSS had been established, and were used to establish the validity of the other questionnaire by calculating the intercorrelations among the three measures.

Visual Analogue Scale (VAS). Fatigue in this study was defined as subjective feelings of tiredness and lack of energy. To assess the degree to which subjects feel fatigued, a visual analogue scale was used. Subjects were asked to indicate the point on a 100 mm line ranging from "no fatigue" to "severe fatigue" that best described their current state. The distance of their mark from the "no fatigue" end of the line was then measured in millimetres with a ruler, and recorded. A sample of the VAS may be found in Appendix D.

The reliability and validity of a VAS for rating severity of fatigue has been well established (Buxton, Frizelle, Parry, Pettigrew, & Hopkins, 1992; Krupp et al., 1988; Krupp et al., 1989; Smith Blesch et al., 1991). For example, in the Buxton et al. (1992) study, the VAS was found to have highly significant positive correlations

(.87) with objective physical measures of fatigue, and the authors suggested that if time limitations permit the use of only one measure, the VAS should be used. In addition, one of the purposes of this study was to investigate the validity of the other measures of fatigue severity, and the VAS has been used extensively for this purpose (Buxton et al., 1992; Krupp et al., 1988; Krupp et al., 1989; Smith Blesch et al., 1991).

The Fatigue Severity Scale (FSS). Fatigue severity was also assessed using the Fatigue Severity Scale (FSS) developed by Krupp et al. (1989). The FSS is a nine-item scale used to rate overall fatigue severity at a point in time (see Appendix E for complete scale). Subjects were asked to indicate on a scale of 1 to 7 how much they agreed with various statements. A rating of 1 represents the descriptor "strongly disagree", and a rating of 7 represents the descriptor "strongly agree" (Krupp et al., 1989). Scores for the nine items were then totalled; scores could range from 9 to 63. The items on the FSS are more specific than the VAS, which does not break down fatigue into different items; thus, it was a good contrast to the VAS. In addition, the FSS is more concerned with the impact of fatigue level on everyday functioning, rather than just severity of fatigue.

This scale has a high degree of internal consistency, test-retest reliability, and validity (Krupp et al.,

1989). Internal consistency, as measured by Cronbach's alpha, was .88 (Krupp et al., 1989). Test-retest reliability on this measure was investigated in 11 patients (5 with systemic lupus erythematosus, and 6 with multiple sclerosis) for whom there were no clinical reasons to expect changes in their fatigue state. The subjects were asked to complete the FSS on two different occasions, the time period ranging from 5 to 33 weeks. No significant changes in FSS scores were found, and the authors concluded that the FSS had high test-retest reliability (Krupp et al., 1989). The validity of the FSS was investigated by correlating scores on the FSS with those on the VAS. A significant positive correlation was obtained (.68, $p<.001$), and the authors concluded that the FSS was a valid measure of fatigue severity (Krupp et al., 1989).

Fatigue Questionnaire. In addition to the VAS, fatigue severity was assessed by having the participants fill out the subjective fatigue questionnaire used by Wessely and Powell (1989). (Please see Appendix F for the complete questionnaire.) This questionnaire has 13 items, 8 of which rate physical fatigue and 5 of which rate mental fatigue. For the purposes of this study, physical fatigue was defined as perceived muscle weakness, and mental fatigue was defined as subjective complaints of

cognitive difficulties such as difficulty concentrating, word-finding difficulties, and memory problems.

The rating scale for this scale was altered somewhat for this study from that originally used by Wessely and Powell (1989). Wessely and Powell (1989) had subjects rate each item with a number from 0-2, representing the descriptors "same as usual", "worse than usual", or "much worse than usual". This did not allow for the rating of "better than usual" if the participant was "having a good week", as many CFS suffers do. Therefore, subjects in this study were asked to rate each item with a number from 1-7, representing the descriptors "much better than usual", "better than usual", "slightly better than usual", "same as usual", "slightly worse than usual", "worse than usual", and "much worse than usual" . The maximum score that could be achieved was 56 for physical fatigue and 35 for mental fatigue, while the minimum scores were 8 and 5 respectively.

This scale was used for several reasons. First, the scale separated physical and mental fatigue, and the importance of this distinction has already been discussed. In addition, Wessely & Powell (1989) reported that both physical and mental fatigue measures had high internal reliabilities as measured by Cronbach's alpha (.75 and .87 for physical and mental fatigue respectively), suggesting that a single construct underlies each measure. Since the

validity of this questionnaire had not been established, one of the purposes of this study was to investigate this. Finally, this questionnaire was more specific in its assessment of fatigue than the VAS or the FSS, and provided a good contrast to the other two. In addition, while the other two scales assessed current global impairment and impact of fatigue on functioning, this questionnaire assessed fatigue severity in comparison to usual levels of fatigue.

Procedure

Recruitment. Participants recruited through the general practitioner were approached first by the doctor and asked if they would be willing to participate in the study. Each CFS patient was given a copy of a description of this study to take home and peruse. (See Appendix G for the complete form.) Patients who were willing to participate were then contacted by phone by the researcher to discuss further details of the study. Participants from support groups were recruited at the group meetings. The researcher went to the meetings, described the study, and asked interested members to leave their names and phone numbers with the researcher or the coordinator of the group. They were then contacted further by phone by the researcher. All potential participants were interviewed to determine if they had been diagnosed with

CFS. Those people who had not been diagnosed with CFS were not included in the study.

Once the diagnosis of CFS had been confirmed, a time was arranged to conduct the interview. Although some interviews were conducted in a testing room at the university, the majority were conducted in the subjects' homes either because the subjects were too tired or they lived too far to come to the university. All interviews were conducted in a quiet room free from distractions.

Interview. The interview consisted of description of the study to the participant, completion of a consent form which described the study and assured the participant of confidentiality (see Appendix G), and collection of basic demographic data such as age, sex, total household income, history of major medical and psychiatric illnesses which may affect the CFS symptoms, such as Multiple Sclerosis, or Major Depression, and length and severity of CFS. Each participant was assigned a number to enable the data to be recorded anonymously.

The participants were then asked to complete the three fatigue measures and the first 370 questions of the MMPI-2. Given the nature of CFS, the majority of participants had difficulty completing the questionnaires without assistance. It was necessary for the researcher to provide assistance by rephrasing some items for clarification (in particular the MMPI-2 items which

involved double negatives), reading the questions out loud, or filling in the answer forms for the participants. For those participants who were experiencing a great deal of difficulty, each item was completed with the aid of the researcher to ensure that the intended answer was recorded correctly.

Data Analysis. Once the data had been collected, the MMPI-2 was scored and the raw scores were converted to T-scores in line with the usual interpretation of the test. Data analysis was conducted using SPSS, and consisted of the following stages:

1/ Descriptive statistics including means and standard deviations for the demographic data as well as the scores on all of the various tests (i.e. the fatigue measures, and the MMPI-2 scales) were calculated for the entire sample as a whole as well as for males and females separately to provide a description of the sample. Sexes were compared on the demographic variables and fatigue measures using t-tests.

2/ The intercorrelations among the fatigue measures were calculated to determine the concurrent validity of the measures, with the expectation that the measures would be significantly positively correlated.

3/ The Cronbach alpha coefficients of the Fatigue Severity Scale, Fatigue Questionnaire, Fatigue Questionnaire, Mental Fatigue, and Fatigue Questionnaire, Physical

Fatigue were calculated to provide a measure of internal consistency. Cronbach's alpha values greater than .65 were considered adequate for present research purposes.

4/ The average MMPI-2 profiles found for male and female subjects in this sample were obtained by calculating the mean scores on each MMPI-2 scale. The average profiles for males and females were compared to the average profiles found for males and females in the Miller Iger (1992) study using t-tests to determine whether the mean raw scores for each MMPI-2 scale (including K where appropriate) differed significantly between subject samples. No significant differences were expected.

5/ The Pearson correlation coefficients for the correlation between each of the three separate measures of fatigue severity and the scores on each of the MMPI-2 scales were calculated to determine if there were relationships among the variables. It was expected that scores on the three fatigue measures would each be positively correlated with scores on the following MMPI-2 basic clinical scales: 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), and 7 (Psychasthenia). It was also expected that the three fatigue measures would each be negatively correlated with scores on Scale 9 (Mania).

6/ The MMPI-2 raw scores for male and female participants in high and low fatigue groups on all fatigue measures were compared separately using t-tests. Group membership

was determined using a median-split method. With such a method, scores below the median were categorized as low fatigue, while scores above the median were categorized as high fatigue. It was expected that clinically significant differences between high and low fatigue groups would be found on MMPI-2 basic clinical scales 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), 7 (Psychasthenia), and 9 (Mania) for both males and females.

CHAPTER III

RESULTS

Description of Sample

A total of 36 people participated in this study; data from 3 of the people was not used due to invalid MMPI-2 profiles, leaving 33 participants. Of the 33 participants, 26 (79%) were women and 7 (21%) were men; this is consistent with a typical CFS population. The mean age for the sample was 39.7 years (SD = 9.5). Selected demographic features of the participants are presented in Table 1. Of the participants tested, 84.9% had an education beyond grade 13, and 69.7% reported a total household income of $50,000 or greater. The t-tests comparing sexes on the various demographic variables showed no significant differences.

With respect to medical history, 9 of the participants reported having a medical condition prior to the onset of CFS (8 women, and 1 man). Six of these participants had a thyroid condition; the other 3 reported having had a Major Depressive Episode. The remaining 24 participants reported no significant medical conditions.

Table 1

Frequency of Demographic Variables

Demographic Variable	Mean	Standard Deviation	Minimum	Maximum
Age	39.7	9.5	24.0	60.0
Household Income	50K-60K	20K-40K	<10K	>100K
Years of Education	16.2	2.8	11.0	23.0
Months since Diagnosis	34.7	23.7	3.0	87.0
Months since Onset	73.8	39.4	15.0	168.0
% Debilitated	61.9	17.3	25.0	90.0

Most participants reported having been ill with CFS for approximately 6 years. On average, the diagnosis of CFS occurred approximately 3 years prior to testing. At the time of testing, participants on average reported being 61.9% debilitated (SD= 17.3). With respect to their current functioning, 21 (64%) participants felt that their symptoms were better than 1 year ago, 5 (15%) reported that their symptoms were the same, and 7 (21%) reported that their symptoms were worse.

Reported Levels of Fatigue

Table 2 shows the means and standard deviations for females on the various fatigue measures. Females reported fairly high levels of fatigue on average, but were not severely fatigued. The means and standard deviations for males on the various fatigue measures can be found in Table 3. Although males scored somewhat lower than females on the fatigue measures, t-tests comparing sexes showed a significant difference on the VAS only ($t= -2.16$, $p<.05$). There were no sex differences for scores on the FSS, FQ, FQP, or FQM.

Reliability of Scaled Fatigue Measures

Table 4 shows the internal reliability of the Fatigue Severity Scale (FSS), Fatigue Questionnaire (FQ), Fatigue Questionnaire, Physical Fatigue (FQP), and Fatigue

Table 2

Means and Standard Deviations of Fatigue Measures for Female CFS Patients (N=26)

Fatigue Measure	Possible Range of Scores	Mean	Standard Deviation
Visual Analogue Scale (VAS)	000mm - 100mm	58.038	22.173
Fatigue Questionnaire (FQ)	13 - 91	61.154	14.063
Fatigue Questionnaire, Physical Fatigue (FQP)	8 - 56	37.423	9.437
Fatigue Questionnaire, Mental Fatigue (FQM)	5 - 35	23.731	5.547
Fatigue Severity Scale (FSS)	9 - 63	55.962	7.613

Table 3

Means and Standard Deviations of Fatigue Measures for Male CFS Patients (N=7)

Fatigue Measure	Possible Range of Scores	Mean	Standard Deviation
Visual Analogue Scale (VAS)	000mm - 100mm	36.571	27.742
Fatigue Questionnaire (FQ)	13 - 91	52.714	9.979
Fatigue Questionnaire, Physical Fatigue (FQP)	8 - 56	31.714	7.889
Fatigue Questionnaire, Mental Fatigue (FQM)	5 - 35	21.000	4.830
Fatigue Severity Scale (FSS)	9 - 63	58.571	4.077

Table 4

Internal Reliability for Scaled Measures of Fatigue as Measured by Cronbach's alpha

	Present Sample alpha Levels		
Fatigue Scale	Males (N=7)	Females (N=26)	Total Sample (N=33)
FSS	.57	.85	.83
FQ	.88	.95	.94
FQP	.92	.94	.94
FQM	.90	.88	.89

Questionnaire, Mental Fatigue (FQM) as measured by Cronbach's alpha. With the exception of the FSS for males, all fatigue measures met the test for internal reliability, having Cronbach's alpha levels greater than .65. Since the FSS did not have sufficient reliability with males in this sample, it was not used in subsequent analyses.

The alpha levels obtained in this study are within the range of those found by other authors using the same scales. For example, Krupp et al. (1989) reported a Cronbach's alpha of .88 for the FSS. The Cronbach's alpha levels reported by Wessely and Powell (1989) for the FQP and FQM are .75 and .87 respectively (an alpha level for the total FQ was not reported). Although the rating scale for the FQ was altered somewhat for this study, the high levels of Cronbach's alpha obtained attest to its internal reliability.

Relationship of Fatigue Measures

Table 5 depicts the intercorrelations among the fatigue measures for female participants. As was hypothesized, the intercorrelations for the fatigue measures were significant and positive, with the exception of the correlation between the VAS and FQM, which was not significant. Thus, an increase in mental fatigue as measured by the FQM was not significantly related to an

Table 5

Intercorrelations Among Fatigue Measures for Female CFS Patients (N=26)

Fatigue Measure	VAS	FQ	FQP	FQM	FSS
VAS	1.000	.4200*	.4386*	.3188	.4374*
FQ		1.000	.9648**	.8943**	.5141**
FQP			1.000	.7451**	.4696*
FQM				1.000	.5046**
FSS					1.000

* p<.05, two-tailed. ** p<.01, two-tailed.

increase in overall fatigue severity as measured by the VAS for female participants. For male participants, a significant positive correlation between the FQ and the FQP was obtained ($r=.8795$, $p<.01$). The other intercorrelations for male participants did not achieve the .05 significance level. This is likely due to the lack of statistical power as a result of the low sample size for male participants.

MMPI-2 For Female Participants

The average MMPI-2 profile for female participants can be found in Figure 1. As was hypothesized, clinical significance was obtained for the following MMPI-2 basic clinical scales: 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), 7 (Psychasthenia), and 8 (Schizophrenia). When the MMPI-2 scores of females with a previous medical condition were compared to those without, females with a previous medical condition (N=8) scored significantly higher on Scale 9 (Mania) than those with no previous medical condition ($t= -3.10$, $p<.01$).

The average MMPI-2 profile for the female CFS sample in Miller Iger's (1992) study can be found in Figure 2. The comparison of the average MMPI-2 raw scores obtained by females in this sample and Miller Iger's sample can be found in Table 6. Significant differences were found for Scales L (Lie), F (Infrequency), 2 (Depression), 4

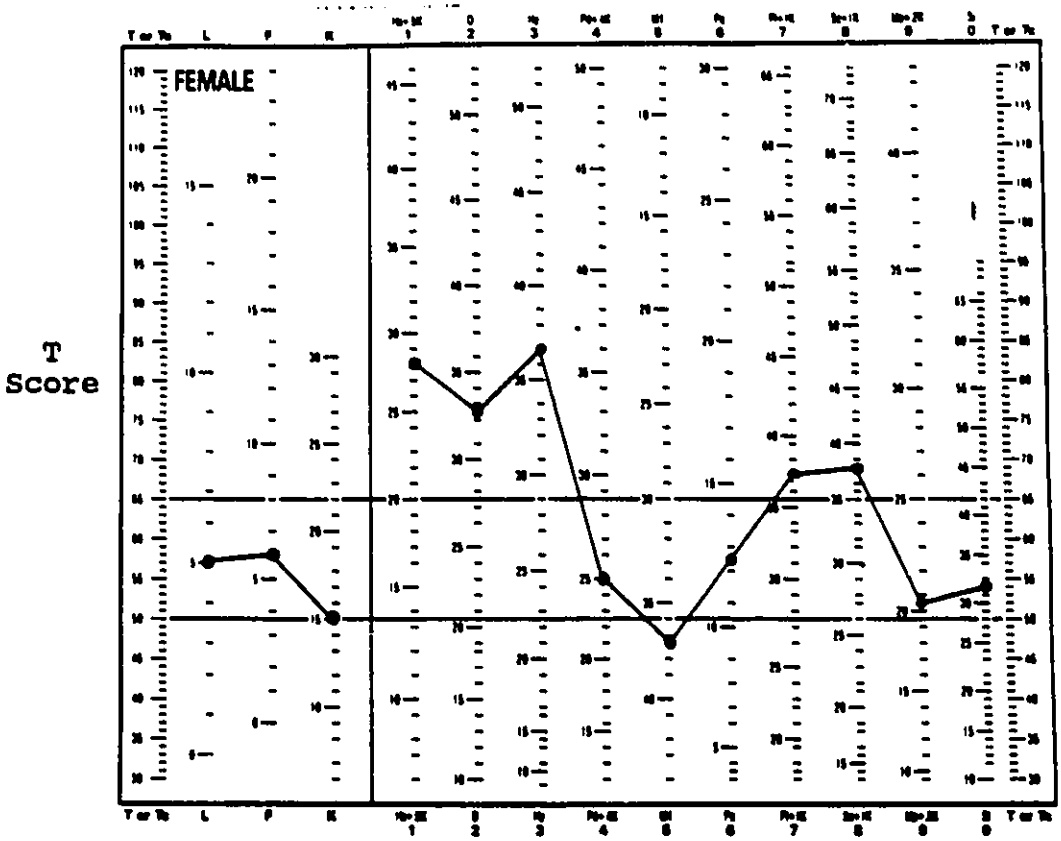

Figure 1. Average MMPI-2 Profile for Female Participants.

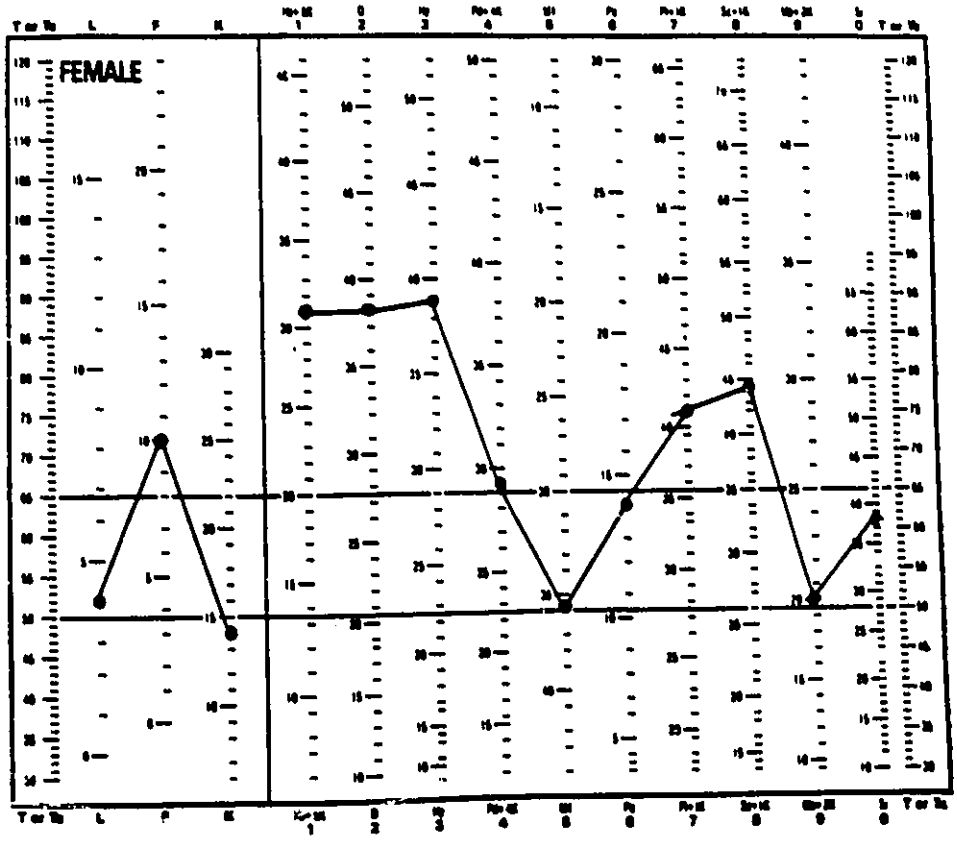

Figure 2. Average MMPI-2 Profile for Female CFS Subjects in Miller Iger's Study.

Note. The data for the Miller Iger sample is from "The MMPI-2 Chronic Fatigue Syndrome Profile" by L. Miller Iger, 1992, The CFIDS Chronicle, September, available from The CFIDS Association, Inc., PO Box 220398, Charlotte, North Carolina 28222-0398, phone number (800) 442-3437.

Table 6

MMPI-2 Raw Scores for Present Female CFS Patients vs. Miller-Iger Female CFS Patients

MMPI-2 Scale	Present Sample (N=26)		Miller-Iger Sample (N=41)		t-test
	Mean	Standard Deviation	Mean	Standard Deviation	
L	4.885	1.946	3.478	1.951	2.87*
F	6.269	3.219	9.463	4.572	-3.10*
K	15.192	4.673	13.756	4.789	-1.21
1	28.538	5.316	30.902	4.960	-1.85
2	32.462	6.243	37.244	5.651	-3.23*
3	36.885	6.088	38.683	5.392	-1.27
4	25.423	4.835	27.732	3.775	-2.18*
5	37.308	4.287	36.000	4.278	1.22
6	12.692	4.611	13.854	3.175	-1.22
7	37.308	5.690	41.415	5.509	-2.93*
8	38.115	8.506	44.171	7.569	-3.04*
9	20.462	5.770	20.293	4.326	0.14
0	32.885	9.429	37.634	10.190	-1.91

Note. The data for the Miller Iger sample is from "The MMPI-2 Chronic Fatigue Syndrome Profile" by L. Miller Iger, 1992, The CFIDS Chronicle, September, available from The CFIDS Association, Inc., PO Box 220398, Charlotte, North Carolina 28222-0398, phone number (800) 442-3437.

* $p<.05$, two-tailed.

(Psychopathic Deviate), 7 (Psychasthenia), and 8 (Schizophrenia). Although the average profile for the present sample was somewhat lower than that obtained by Miller Iger (1992), the overall trend is very similar, and clinical significance was obtained on five of the same six clinical scales (Scales 1, 2, 3, 7, and 8). Clinical significance was not obtained on Scale 4 (Psychopathic Deviate) as it was in Miller Iger's (1992) study.

MMPI-2 for Male Participants

The average MMPI-2 profile for male participants can be found in Figure 3. As was hypothesized, clinical significance was obtained for the following MMPI-2 basic clinical scales: 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), 7 (Psychasthenia), and 8 (Schizophrenia). The average MMPI-2 profile for the male CFS sample in Miller Iger's (1992) study can be found in Figure 4. Table 7 shows the comparison of the average MMPI-2 raw scores obtained by males in this sample and Miller Iger's sample. Significant differences were found for Scales 1 (Hypochondriasis), 3 (Hysteria), and 7 (Psychasthenia). As with the female participants, the average profile for the present male sample was somewhat lower than that obtained by Miller Iger (1992), but the overall trend is very similar and clinical significance was obtained on the same five clinical scales (Scales 1, 2, 3, 7, and 8).

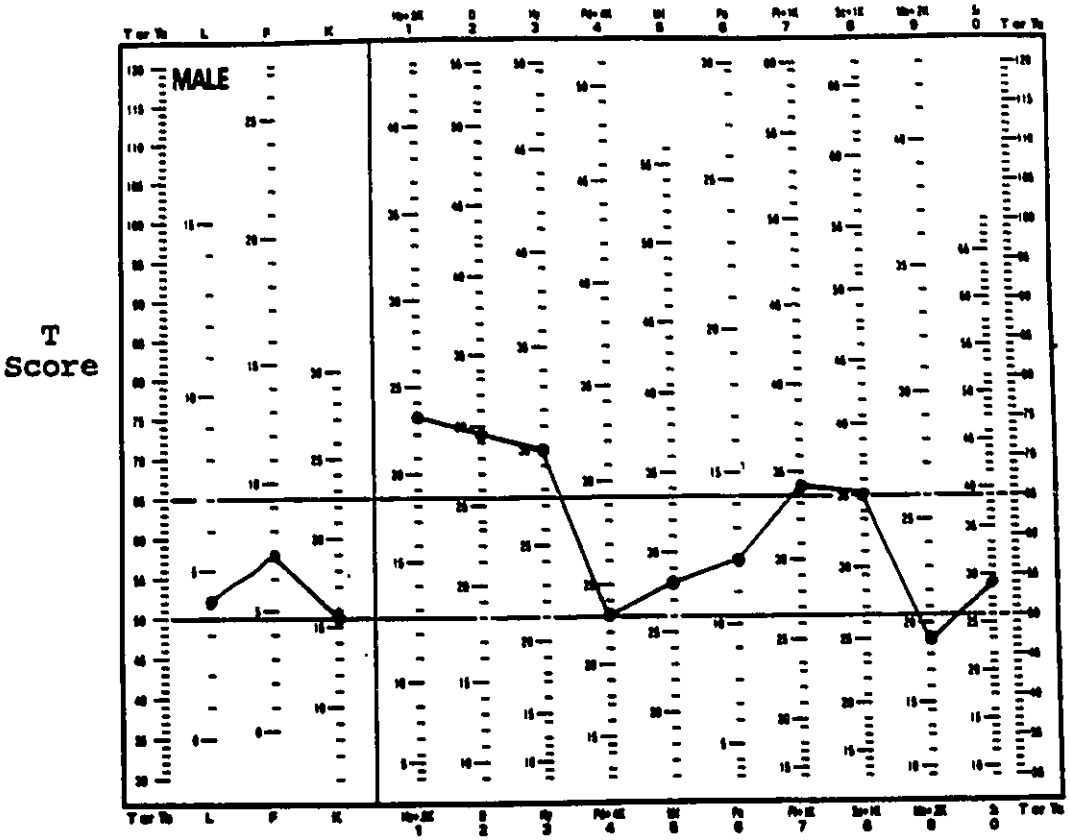

Figure 3. Average MMPI-2 Profile for Male Participants.

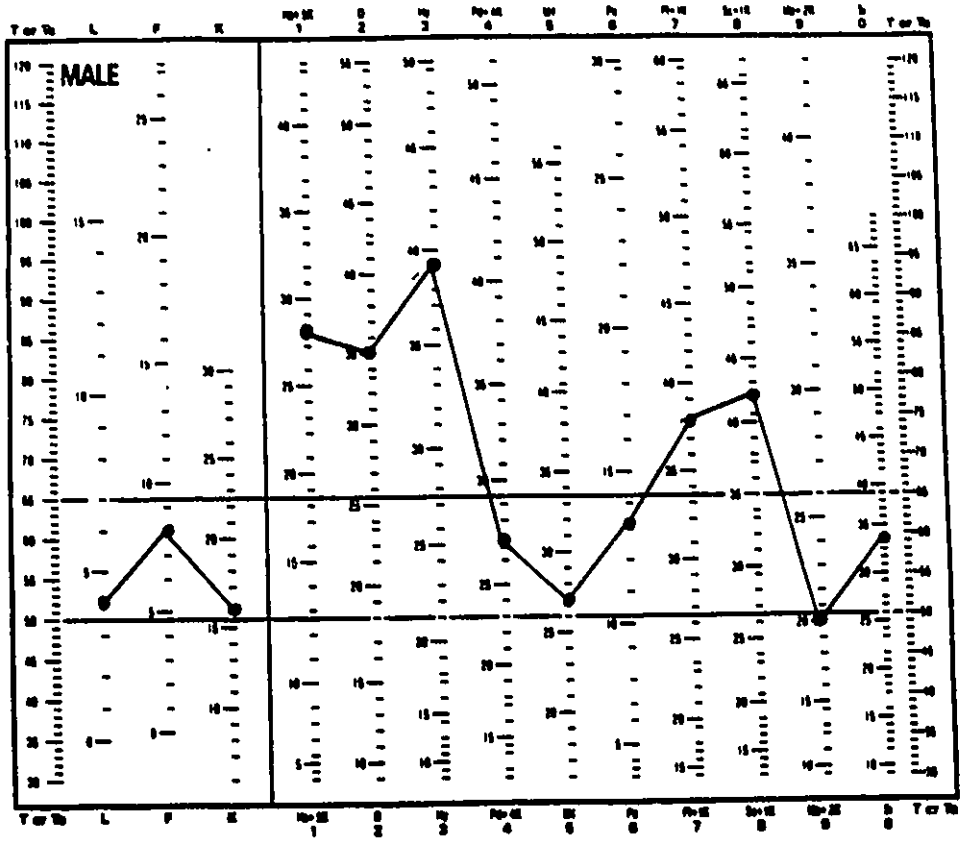

Figure 4. Average MMPI-2 Profile for Male CFS Subjects in Miller Iger's Study.

Note. The data for the Miller Iger sample is from "The MMPI-2 Chronic Fatigue Syndrome Profile" by L. Miller Iger, 1992, The CFIDS Chronicle, September, available from The CFIDS Association, Inc., PO Box 220398, Charlotte, North Carolina 28222-0398, phone number (800) 442-3437.

Table 7

MMPI-2 Raw Scores for Present Male CFS Patients vs. Miller-Iger Male CFS Patients

MMPI-2 Scale	Present Sample (N=7)		Miller-Iger Sample (N=12)		t-test
	Mean	Standard Deviation	Mean	Standard Deviation	
L	3.857	3.288	4.083	1.730	-0.20
F	7.286	4.152	7.917	5.648	-0.26
K	15.429	5.159	16.333	5.365	-0.36
1	23.000	3.742	27.833	3.785	-2.70*
2	29.571	9.034	35.083	5.885	-1.62
3	29.857	5.242	38.667	3.172	-4.61*
4	23.857	4.706	26.833	4.174	-1.43
5	28.571	5.350	27.083	4.833	0.62
6	12.143	1.676	12.500	3.656	-0.24
7	34.429	6.188	39.250	3.817	-2.11*
8	35.286	6.897	41.583	7.798	-1.77
9	19.286	5.589	19.750	4.003	-0.211
0	29.143	14.994	33.000	8.528	-0.72

Note. The data for the Miller Iger sample is from "The MMPI-2 Chronic Fatigue Syndrome Profile" by L. Miller Iger, 1992, The CFIDS Chronicle, September, available from The CFIDS Association, Inc., PO Box 220398, Charlotte, North Carolina 28222-0398, phone number (800) 442-3437.

* $p<.05$, two-tailed.

MMPI-2 and Fatigue Level

Table 8 depicts the significant correlations obtained between fatigue measures and the MMPI-2 scores for female participants. As was hypothesized, increased fatigue as reported on the VAS was significantly related to increased scores on the following MMPI-2 basic clinical scales: 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), and 7 (Psychasthenia). There was also a significant positive correlation between the VAS and Scale 8 (Schizophrenia). In addition, increased fatigue as measured by the FQ and FQP was significantly related to an increase on Scale 1. There was not a significant negative correlation between fatigue severity and Scale 9 (Mania), as was hypothesized.

Table 9 shows the significant correlations obtained between measures of fatigue and MMPI-2 scores for male participants. In general, increased levels of fatigue as reported on the VAS were significantly positively correlated with increased scores on the following MMPI-2 basic clinical scales: 2 (Depression), 6 (Paranoia), 7 (Psychasthenia), 8 (Schizophrenia), and 0 (Social Introversion), and significantly negatively correlated with scores on Scale K (Correction or Defensiveness). There was not a significant negative correlation between fatigue severity and Scale 9 (Mania), as hypothesized. No other correlations between fatigue measures and MMPI-2 scales reached the .05 significance level for male participants.

Table 8

Correlations Between Fatigue Measures and MMPI-2 Scales for Female CFS Patients (N=26)

	Fatigue Measure		
MMPI-2 Scale	VAS	FQ	FQP
1	.5618**	.4135*	.4243*
2	.4645*	.3864	.3801
3	.4792*	.1997	.2063
7	.4149*	.3003	.2418
8	.4995**	.3847	.3756

Note. MMPI-2 Scales that were not significantly related to the fatigue measures were omitted.

* $p<.05$, two-tailed. ** $p<.01$, two-tailed.

Table 9

Correlations Between VAS and MMPI-2 Scales for Male CFS Patients (N=7)

MMPI-2 Scale	VAS
K	-.8683*
2	.8251*
6	.8976*
7	.8304*
8	.7568*
0	.7743*

Note. All nonsignificant correlations were omitted.

* $p<.05$, two-tailed.

High vs. Low Fatigue Comparisons

To further determine the relationship between fatigue and scores on the MMPI-2 scales, the MMPI-2 raw scores for females in high and low fatigue groups were compared. Group membership was determined using a median-split method in which females who scored above the median were assigned to the high fatigue group, and those below the median were assigned to the low fatigue group. The results can be found in Table 10. Significant differences between groups were only found when groups were categorized on the basis of the VAS. Females in the high fatigue group obtained significantly higher scores on the following MMPI-2 scales: 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), and 8 (Schizophrenia). It should be noted that the mean scores for the low fatigue group on these MMPI-2 were still elevated to clinically significant levels. No significant relationships were obtained between MMPI-2 scales and fatigue levels as measured by the FSS, FQ, FQP, or FQM. With respect to the relevant MMPI-2 scales, significant differences between high and low fatigue groups on the basis of the VAS were found for Scales 1, 2, and 3, but not Scale 7, as was hypothesized.

In addition, the MMPI-2 raw scores for males in high and low fatigue groups were compared, and the significant differences can be found in Table 11. Group membership

Table 10

MMPI-2 Raw Scores for Low Fatigue vs. High Fatigue CFS Females on the VAS

	Low Fatigue Group (N=13)		High Fatigue Group (N=13)		
MMPI-2 Scale	Mean	Standard Deviation	Mean	Standard Deviation	t-test
1	26.2308	5.215	30.8462	4.488	-2.42*
2	29.9231	5.619	35.0000	5.972	-2.23*
3	34.1538	4.120	39.6154	6.640	-2.52*
8	34.5385	7.512	41.6923	8.159	-2.33*

Note. All nonsignificant t-tests were omitted.

* $p<.05$, two-tailed

Table 11

MMPI-2 Raw Scores for Low Fatigue vs. High Fatigue CFS Males on the VAS and FQM

	Low Fatigue Group VAS Score (N=4)		High Fatigue Group VAS Score (N=3)		
MMPI-2 Scale	Mean	Standard Deviation	Mean	Standard Deviation	t-test
F	4.5000	3.109	11.0000	1.000	-3.42*
1	20.2500	1.893	26.6667	1.155	-5.13**
2	23.2500	3.862	38.0000	6.000	-4.00**
7	30.5000	4.203	39.6667	4.041	-2.90*
	FQM Score (N=4)		FQM Score (N=3)		
	Mean	Standard Deviation	Mean	Standard Deviation	
L	6.0000	2.708	1.0000	0.000	3.12*
K	19.2500	2.630	10.3333	1.155	5.39**
4	20.2500	1.500	28.6667	1.528	-7.29**
7	30.5000	4.203	39.6667	4.041	-2.90*

Note. All nonsignificant t-tests were omitted.

* $p<.05$, two-tailed. ** $p<.01$, two-tailed.

was determined by the median split method described above. When males were grouped on the basis of the VAS, males in the high fatigue group scored significantly higher on MMPI-2 Scales F (Infrequency), 1 (Hypochondriasis), 2 (Depression), and 7 (Psychasthenia). When males were grouped on the basis of the FQM, males in the high fatigue group scored significantly higher on MMPI-2 Scales L (Lie), K (Correction, or Defensiveness), 4 (Psychopathic Deviate), and 7 (Psychasthenia). Thus, with respect to the relevant MMPI-2 scales, significant differences were obtained on Scales 1, 2, and 7, but not Scale 3, as was hypothesized.

CHAPTER IV

DISCUSSION

The high proportion of females in this sample, as well as the participants' high education level, and length of illness are all consistent with reported demographic features of CFS populations in other studies (Blakely et al., 1991; Miller Iger, 1992; Ray et al., 1992). The levels of mental and physical fatigue, and the recorded impact that fatigue had on participants' daily functioning were also consistent with results found in other studies (Krupp et al., 1991; Wessely & Powell, 1989). Thus, this sample appears to be comparable to samples of CFS patients in other studies with respect to demographic variables.

In general, the main hypotheses of this study were supported. For example, the MMPI-2 profiles found for CFS patients in this study replicated the findings in the Miller Iger (1992) study. Although there were significant differences between scores on some of the MMPI-2 scales in this study as compared to those in the Miller Iger (1992) study, clinical significance was obtained on five of the same six scales for females (Scales 1, 2, 3, 7, and 8),

and the same five scales for males (Scales 1, 2, 3, 7, and 8). With respect to the second main research question concerning the relationship between fatigue severity and scores on relevant MMPI-2 scales, increased fatigue was positively correlated with certain relevant MMPI-2 scales (Scales 1, 2, 3, and 7 for females, and Scales 2 and 7 for males), as was hypothesized. Significant correlations were also obtained for MMPI-2 scales other than those hypothesized; these will be discussed in a later section. A comparison of high vs. low fatigue groups showed significant differences on relevant MMPI-2 scales (Scales 1, 2, and 3 for females and Scales 1, 2, and 7 for males) as was hypothesized. Significant differences were also obtained between high and low fatigue groups on other MMPI-2 scales; these will be discussed in a later section.

Measures of Fatigue Severity

Fatigue in this study was assessed using three fatigue measures. Each measure was designed to assess a different aspect of the participants' fatigue experience. For example, the Visual Analogue Scale (VAS) assessed fatigue severity (Smith Blesch et al., 1991). The Fatigue Severity Scale (FSS), in contrast, measured the impact of fatigue on a person's daily functioning (Krupp et al., 1989). The Fatigue Questionnaire (FQ) assessed both physical and mental fatigue (FQP and FQM

respectively), and asked participants to rate items with respect to their usual level of functioning. Thus, two subjects may have had very different scores on the VAS because their current levels of fatigue were different, but they may have had the same score on the FQ, because their current level of fatigue was the same as it usually was.

For purposes of this study, the rating scale for the FQ was altered. This change was made to allow subjects to rate items with varying degrees of the descriptors "better than", "the same as", or "worse than" usual. It has been well documented that the severity of symptoms of CFS vary from week to week (Calabrese et al., 1992; Ray, 1991; Wood et al., 1991). The rating scale for the FQ used by Wessely and Powell (1989) did not allow subjects to rate an item with the descriptor "better than usual", although this could very well be the subject's experience. Participants in this study did, in fact, assign items on the FQ ratings of "better than usual", attesting to the utility of the change. In addition, the rating scale for the FQ was changed from a 3-point Likert type scale, to a 7-point Likert type scale. This change improved the psychometric properties of the scale by allowing for greater variance, as participants had the opportunity to rate different intensities of their experience. As pointed out by Kerlinger (1986), an increase in

variability increases the reliability of the scale. Thus, the 7-point rating scale should be more reliable than the 3-point scale, as well as have greater utility.

Tests of internal consistency for the FSS, FQ, FQP, and FQM showed that with the exception of the FSS for males, all of the fatigue measures were reliable. In addition, the Cronbach's alpha coefficients for the FSS, and the mental and physical fatigue subdivisions of the FQ obtained in this study coincided with those obtained in other studies (Krupp et al., 1989; Wessely & Powell, 1989). Thus, it appears that the change in rating scale for the FQ did not affect its internal reliability. In fact, the reliabilities for the FQP and FQM obtained in this study are higher than those reported in a previous study (Wessely & Powell, 1989). Due to its lack of reliability, the FSS was not used in analyses involving male subjects. The lack of reliability of the FSS for males in this study may be due to the small sample size of males, which resulted in a truncated range. As noted by Kerlinger (1986), the low variance that results from a small range may affect the reliability of a scale.

Participants in this study reported midranges of fatigue on the VAS, and were therefore not severely fatigued. This is likely due to the fact that the majority of participants rested for a few days prior to testing so that they would be able to participate. For

some CFS sufferers, even small amounts of physical or mental exertion may sometimes result in unexplained severe fatigue (Calabrese et al., 1991). Participants stated that resting for several days prior to performing an important task was beneficial in reducing the effect of the exertion.

The average fatigue severity for participants in this study was moderately high as reported on the VAS, with females having significantly higher levels of fatigue than males. On average, male and female participants rated their physical and mental fatigue on the FQ as being slightly worse than usual at the time of testing. This seems somewhat contradictory, with participants not reporting severe fatigue because they had rested, and yet reporting that their fatigue was slightly worse than usual. It is possible that this discrepancy comes from the VAS, on which participants were required to define their own anchor points of "no fatigue" and "severe fatigue". It is highly likely that participants were defining severe fatigue as happening only when they were bedridden; in fact, several participants used this definition when completing the VAS. In general, the severe fatigue that had participants bedridden did not occur often, and their usual level of fatigue fell more on the midpoint of the VAS. Therefore, although participants did not report severe fatigue at the time of testing

because they were not bedridden, their fatigue was slightly worse than usual.

Both males and females in this study reported that their fatigue had a significant impact on their daily functioning. Thus, although sexes differed in the severity of the fatigue they were experiencing at the time of testing as measured by the VAS, they did not differ in the impact that fatigue had on their everyday functioning as measured by the FSS, nor did they differ when they compared their fatigue severity to their usual fatigue state on the FQ. There were no sex differences for scores on the FSS, FQ, FQP, or FQM.

Evidence for the concurrent validity of the fatigue measures comes from the intercorrelations among them. As hypothesized, the intercorrelations were positive and significant for female participants, with the exception of the correlation between the VAS and FQM. The correlation coefficient obtained for the relationship between the FSS and VAS is consistent with that found in a previous study (Krupp et al., 1989). Although the fatigue measures were designed to assess different aspects of fatigue, increased scores on one measure were associated with increased scores on the other measures. This was true for the relationship between the VAS and FSS, and the VAS and FQP. An increase in fatigue severity as measured by the VAS was not associated with an increase in mental fatigue as

measured by the FQM for female participants. Thus, it appears that on average, participants were referring to the severity of their physical fatigue on the VAS, not their mental fatigue. This may be due to the difficulty that occurs when subjects are asked to quantitatively rate fluctuations in mental constructs such as memory and concentration. It is much easier to quantify physical changes, such as ability to walk up and down stairs, than mental changes, such as ability to remember things or concentrate on a task. Although participants in this study did state that their memory and concentration fluctuated from day to day, they had difficulty deciding how much they had changed. In contrast, it was relatively easy for participants to decide that they were not severely fatigued physically because they could get out of bed that day. Thus, the lack of relationship between fatigue severity as measured by the VAS, and mental fatigue as measured by the FQM may be due to the difficulty in quantitatively rating fluctuations in mental abilities.

Given the small sample size for male participants, and the subsequent lack of statistical power, the results for males should be interpreted cautiously. A significant positive correlation between the FQ and FQP was obtained for male participants in this study. Thus, an increased score on the FQ appeared to be related to an increase in

physical fatigue. However, intercorrelations between other fatigue measures for male participants did not reach statistical significance at the .05 level. Again, this is likely due to the small sample size and lack of statistical power with male participants.

MMPI-2 Profiles for CFS Sufferers

Studies have shown that there is a unique profile of psychological characteristics for CFS sufferers that can be identified with the use of standard psychological instruments such as the MMPI or MMPI-2 (Blakely et al., 1991; Stricklin et al., 1990; Iger, 1990; Miller Iger, 1992). It must be stressed that these studies do not address the question of whether these characteristics are stable personality traits, or are personality states that result from having CFS. There is no definitive answer to this question. The presence of a unique MMPI or MMPI-2 profile for CFS sufferers does not necessarily suggest that people suffering from CFS had a psychological personality syndrome that predisposed them to developing the disorder, as the characteristics associated with such a profile may have resulted from having CFS. The utility of the profile lies in its potential ability to identify people who are currently suffering from CFS, and to aid in differential diagnosis.

The results of the present study show MMPI-2 profiles for male and female participants that are comparable to the MMPI and MMPI-2 profiles found in the studies mentioned above. The overall MMPI-2 profiles for male and female CFS sufferers in this study were very similar to the MMPI profiles found for CFS sufferers in the studies by Blakely et al. (1991), Stricklin et al. (1990), and Iger (1990). Specifically, the average MMPI-2 profile for both males and females in the present study had clinically significant elevations on the following basic clinical scales: 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), 7 (Psychasthenia), and 8 (Schizophrenia). These clinically significant elevations were consistent with those obtained on the MMPI in a study by Stricklin et al. (1990), and, with the exception of the lack of clinical significance on Scale 4 (Psychopathic Deviate), were consistent with those obtained on the MMPI in a study by Iger (1990). The overall shape of the MMPI-2 profiles obtained in this study were comparable to those obtained on the MMPI by Blakely et al. (1991), although clinical significance was not obtained on Scales 7 and 8 in the Blakely et al (1991) study. The clinically significant elevations obtained in the present study were also consistent with those found on the MMPI-2 by Miller Iger (1992), with the exception of a lack of clinical significance on Scale 4 for female participants.

According to the studies which looked at MMPI and MMPI-2 profiles for CFS sufferers, these profiles are indicative of a person who was experiencing depression, tension, anxiety, social withdrawal, somatic discomfort, unhappiness, physical fatigue, feelings of hopelessness, confused thinking, and self-doubt (Blakely et al., 1991; Stricklin et al., 1990; Iger, 1990; Miller Iger, 1992). As noted by Miller Iger (1992) such MMPI and MMPI-2 profiles differ from those of patients who are malingering, or those who are suffering from hypochondriasis or depression.

Once again, it is stressed that the results of this study do not allow us to address the question of whether personality characteristics as measured by the MMPI-2 are stable personality traits that predispose the person to developing CFS, or personality states that result from having a chronic illness such as CFS. This question cannot be answered. Thus, the utility of the MMPI-2 lies in its ability to aid in the diagnosis of CFS as it differs from other similar disorders, such as depression. The MMPI-2 should not be used to identify potential sufferers of CFS or to label CFS sufferers as being mentally ill, rather than physically ill.

When the average MMPI-2 profiles for participants in this study were compared to the average profiles obtained by participants in the study by Miller Iger (1992) using

t-tests, significant differences were found for some scales. Females in this study as compared to those in Miller Iger's study (1992) were significantly lower on measures of symptom distress (Scale F), depression (Scale 2), negative attitudes towards family and society (Scale 4), generalized anxiety (Scale 7), confusion, concentration difficulties, and social alienation (Scale 8). Males in this study as compared to those in the Miller Iger (1992) study scored significantly lower on measures of preoccupation with health (Scale 1), somatic complaints and denial of health-related problems (Scale 3), and generalized anxiety (Scale 7).

Despite these statistically significant differences, it should be stressed that the MMPI-2 profiles are very similar, and, with the exception of Scale 4 for females, have clinically significant elevations on the same basic clinical scales. The lack of clinical significance on Scale 4 for females may be due to the use of volunteers in this study. It is unlikely that people who have negative attitudes toward family and society would volunteer to participate in a study such as this. With respect to the differences between the MMPI-2 profiles, it is possible that participants in this study were not as symptomatic at the time of testing as participants in Miller Iger's (1992) study, and therefore had lower average scores on some of the MMPI-2 scales. As previously mentioned, many

of the participants in this study had rested prior to testing and may not have been experiencing severe symptomatology at the time of testing. This supposition is supported by the fact that participants did not rate themselves as being severely fatigued at the time of testing. In addition, female participants in this study had significantly lower scores on Scale F, which is a measure of symptom distress.

Female participants with history of a thyroid condition or depression had significantly higher scores on Scale 9 (Mania) than females with no such medical history. It is possible that the stimulation that may result from a thyroid condition, or anti-depressant medication is associated with the elevated mood and increased energy level measured by Scale 9. It is also possible that previous experience with a chronic illness allowed those females with a medical history to approach their CFS with a more positive outlook, have more motivation, and experience less lethargy.

MMPI-2 and Fatigue Severity

Several psychological variables as measured by the MMPI-2 were related to the intensity of the fatigue experienced by participants in this study. For females, an increase in self-rated fatigue severity as measured by the VAS was associated with increased preoccupation with

health (Scale 1), depression (Scale 2), somatic complaints and denial of health-related problems (Scale 3), anxiety (Scale 7), confusion, difficulty concentrating, and social alienation (Scale 8). In addition, increased severity of fatigue as measured by the FQ and FQP was associated with increased preoccupation with health (Scale 1). These results are consistent with what was hypothesized. Specifically, it was hypothesized that increased fatigue would be significantly positively correlated with MMPI-2 Scales 1, 2, 3, and 7. These significant correlations were obtained, in addition to a significant positive correlation between fatigue severity on the VAS and MMPI-2 Scale 8.

These results are also consistent with previous studies which have investigated the relationship between fatigue severity and personality characteristics such as depression and anxiety. For example, several studies with many different populations have found that increased fatigue is related to increased depression, anxiety, and confusion (David, 1991; Mikulincer et al., 1989; Ray et al., 1992; Reeves et al., 1991; Smith Blesch et al., 1991). Thus, the results found in the present study not only confirm the hypotheses, but are also consistent with previous studies.

With respect to the results obtained for male participants, these should be interpreted cautiously, as

the small sample size decreased the statistical power of the results. As with female participants, it was hypothesized that for male participants increased fatigue severity would be significantly positively correlated with MMPI-2 Scales 1, 2, 3, and 7. The results for males are somewhat contrary to these hypotheses. For male participants, it was found that increases in fatigue severity were associated with increased defensiveness (Scale K), depression (Scale 2), interpersonal sensitivity, suspiciousness, and insecurity (Scale 6), generalized anxiety (Scale 7), confusion, difficulty concentrating, social alienation (Scale 8), and social anxiety (Scale 0). Thus, it appears that males and females react differently to their illness, although again, these results should be interpreted cautiously. It is possible that different role expectations for males and females may have influenced the reactions of CFS sufferers to their illness. For many participants in this study, the male was the main provider for the family. More often than not a person suffering from CFS is unable to work; for a male who is the main provider for his family, the increased fatigue associated with CFS threatens this role. It is possible that a male CFS sufferer in such a situation would react to increased fatigue with increased defensiveness, depression, insecurity, and anxiety as his perceived role in the family is threatened.

Contrary to hypothesis 4, fatigue severity was not negatively correlated with scores on Scale 9 of the MMPI-2. Thus, increased fatigue was not associated with decreased motivation, impulsiveness, ambitiousness, or extroversion as measured by Scale 9 for participants in this study. It appears that items for Scale 9 are more concerned with mental constructs such as motivation and desire to do things, rather than physical ability to engage in activities. It is possible that participants in this study were assessing the severity of their physical fatigue on the VAS. As previously mentioned, it is easier to rate changes in physical fatigue quantitatively than it is to rate changes in mental fatigue quantitatively. An increase in physical fatigue is not necessarily associated with a decrease in mental motivation. Indeed, many participants in this study commented that although they did not have the energy to go to dances or social gatherings, or be talkative, outgoing, and ambitious, they had the motivation to do such things. In responding to items for Scale 9, participants rated such items according to how they felt mentally, rather than whether they could perform the task physically. In light of this, it makes sense that an increase in fatigue severity would not necessarily be significantly related to a decrease in motivation and ambitiousness as measured by Scale 9.

High vs. Low Fatigue and MMPI-2

When high and low fatigue groups were compared to determine if there were any differences between groups on psychological factors as measured by the MMPI-2, some differences were found. For females, those in the high fatigue group based on the VAS were experiencing significantly more preoccupation with health, depression, somatic complaints, denial of health-related problems, confusion, difficulty concentrating, and social alienation. The results for male participants should be interpreted with caution, as the sample size was low. For males it was found that for those in the high fatigue group based on the VAS were experiencing significantly more defensiveness, preoccupation with health, depression, and anxiety. Those with high scores on the FQM had a higher tendency to respond desirably, were significantly more defensive, had more negative attitudes towards family and society, and were experiencing significantly more anxiety.

The results suggest that as female participants experienced higher levels of fatigue they would become more depressed and anxious, experience more confusion and social isolation, and be more concerned with their health. As male participants experienced higher levels of fatigue, they could be expected to become more defensive,

depressed, and insecure, and experience more anxiety, confusion, and social isolation.

These results are consistent with those found in other studies. For example, studies investigating the relationship between fatigue and psychological factors have found that increased fatigue is related to increased depression, anxiety, and confusion (David, 1991; Mikulincer et al., 1989; Ray et al., 1992; Reeves et al., 1991; Smith Blesch et al., 1991). This has been demonstrated in a number of different populations, including undergraduate students (David, 1991), women in the early stages of pregnancy (Reeves et al., 1991), patients with cancer (Smith Blesch et al., 1991), and CFS patients (Ray et al., 1992). In addition, studies which have directly manipulated fatigue severity either through sleep deprivation or extreme exercise have found that such manipulation leads not only to increased fatigue, but also increased depression, anxiety, and confusion (Cutler & Cohen, 1979; Steptoe & Cox, 1988; Tharion et al., 1988).

It should again be stressed that the results in this study do not answer the question of whether the personality characteristics found to be common in a group of CFS sufferers are stable personality traits, or personality states that result from having the disorder. Thus, no conclusion can be drawn regarding the psychological state of participants prior to the

development of CFS. These results refer only to a group of people who already have CFS. These results in no way allow for the conclusion that participants had common personality traits which resulted in the development of CFS.

VAS vs. Other Fatigue Measures

Contrary to what was hypothesized, all of the fatigue measures were not significantly positively correlated with relevant MMPI-2 scales. The VAS was the fatigue measure which related most to the relevant MMPI-2 scales. In addition, it was the VAS which resulted in the best comparisons between high and low fatigue groups on the relevant MMPI-2 scales for female participants. As previously mentioned, the results for male participants lack statistical power due to the small sample size, and should be interpreted cautiously. These results raise the question of why the other fatigue measures did not have significant relationships with the relevant MMPI-2 scales, as was hypothesized.

It is possible that the nature of the fatigue measures contributed to the lack of significant results. For example, the FSS assessed the impact of fatigue on a participant's life. Many of the participants in this study endorsed the highest response relating to the descriptor "strongly agree" for the majority of the items

on the FSS. This resulted in a ceiling effect, which reduced the utility of the scale when comparing varying levels of fatigue severity, as the range was limited. It seems that the lack of a significant correlation between scores on the FSS and scores on the relevant MMPI-2 scales may have been due to this ceiling effect. The FQ also had a limited range with the sample in this study. The FQ was designed to assess the participants' current level of fatigue with respect to their usual state. On average, participants in this study reported that their current fatigue state was only slightly worse than usual; no participants had scores on the FQ indicating that their overall fatigue was much worse than usual at the time of testing. Thus, the range of scores obtained on this scale was limited. In addition, the FQ did not allow for the meaningful comparison of participants with each other, as there was no reference point for what their usual level of fatigue was. Thus, a t-test comparing participants who scored high or low on this scale was not meaningful.

The results suggest that the VAS was the best measure for relating fatigue severity with psychological factors as measured by the MMPI-2 in this study. In particular, the VAS did not have the psychometric difficulties associated with a ceiling effect and a limited range, as the other two fatigue measures did. In addition, participants completing the VAS were not constrained to

having to choose numbers to rate the severity of their fatigue on the VAS as they were on the other scales. This allowed for maximum flexibility in rating on the part of the participants. It should also be noted that many participants had difficulty completing the FSS and FQ on their own because the wording was sometimes confusing for them, or they had difficulty deciding which rating to assign to an item. They did not, however, have difficulty completing the VAS, as there was little wording. The VAS was therefore shorter, easier to complete, and more meaningful to the participants as they could define their own anchor points of "no fatigue" and "severe fatigue".

Limitations

This study is limited in its correlational and between-subjects rather than within-subjects approach. Such approaches do not allow for a conclusion of causation. Thus, while the study shows relationships between fatigue severity and psychological factors, a cause and effect relationship was not established. As mentioned previously, it was beneficial to investigate any potential relationship prior to conducting a within-subjects study, but the results are limited in their application.

This study is also limited by the nature of the sample used. All participants were volunteers, and were

likely more motivated than people who were not willing to participate. Also, participants who were fatigued to the point where they were bedridden were not able to participate in this study; thus, participants in this study were less fatigued than a usual CFS population. In addition, although the demographic characteristics of this CFS population are consistent with those of CFS populations in other studies, care should be taken in generalizing these results to CFS sufferers outside of the Windsor and Essex County areas.

Clinical Implications

The importance of including the psychological aspects of CFS in the overall understanding and diagnosis of the disorder has been stressed (Blakely et al., 1991; Krupp et al., 1991; Miller Iger, 1992; Stricklin et al., 1990). Many CFS sufferers have to undergo extensive medical testing to receive a diagnosis. Almost every participant in this study commented on the frustration that they had experienced in trying to get a diagnosis. For most people, it took years of testing by different doctors and specialists to receive a diagnosis of CFS. Almost all of them were told at one point that they were simply depressed and not ill with a physical medical disorder. The use of a psychological test such as the MMPI-2 to help differentiate between CFS and depression

would help to prevent some of the misdiagnosis that can and often does occur.

The presence of a distinct MMPI-2 profile for CFS sufferers has already been established (Miller Iger, 1992). The present study confirms those results, attesting to the validity of the profile. Given that many CFS sufferers are interviewed by psychiatrists and/or psychologists as part of the diagnostic process, there is a high potential for the use of the MMPI-2 as part of this process. A clinician who is having difficulty deciding whether a patient has CFS or depression could use the MMPI-2 and compare the profile obtained by the patient with those typical for CFS and depressed patients. If a patient obtained an MMPI-2 profile similar to that for CFS patients, the clinician should seriously consider the diagnosis of CFS, instead of just depression, as a cause for the patient's symptoms.

It is not possible to determine from this study whether changes in fatigue state result in changed elevations on some MMPI-2 scales for CFS sufferers. A within-subjects repeated measures design would have to be used in order to determine the test-rest reliability of the MMPI-2 across different levels of fatigue. This study does suggest, however, that increased fatigue severity is related to increased elevations on certain MMPI-2 scales. In addition, females experiencing high and low levels of

fatigue were significantly different in their scores on some MMPI-2 scales. It should be noted that this in no way questions the validity of the MMPI-2 profile for CFS sufferers. In fact, the mean MMPI-2 scores for females in the low fatigue group were still elevated to clinical significance on the same scales. However, the scores were significantly lower, and it is possible that a female experiencing relatively low levels of fatigue at the time of testing may obtain an MMPI-2 profile that does not have clinical significance on all of the necessary scales, even though the shape of her profile is similar to that of a CFS sufferer. This raises the possibility that the MMPI-2 profile may be a function of the physical symptoms of CFS. It must be stressed that the MMPI-2 profile may be useful only after people have developed CFS to help aid in the differential diagnosis; it should not be used to predict who will develop CFS in the future.

Thus, the state of individuals at the time of testing should be considered when interpreting the results of their MMPI-2 profiles. Extremely high levels of fatigue at the time of testing may be associated with exaggerated elevations on certain MMPI-2 scales, while low levels of fatigue may be associated with lower elevations that do not reach clinical significance. In interpreting the MMPI-2 profiles for potential CFS sufferers, clinicians should consider not only whether clinical significance has

been achieved on all of the appropriate scales, but also whether the overall shape of the profile is consistent with that of the CFS profiles obtained in other studies.

In administering the MMPI-2 to CFS sufferers, care should be taken to ensure that they are answering the items the way they intend to. The cognitive difficulties associated with CFS made answering some questions difficult for participants in this study. For example, participants had difficulty understanding how to answer negatively phrased items such as "What other people say about me to their friends does not bother me" (please note that this is not an actual MMPI-2 item, but is similar in phrasing to an actual item). Many participants would comment that yes, it did bother them, which would require an answer of false to the statement, but they would answer true. When asked about this, participants stated that they had great difficulty doing the cognitive processing required to answer such questions accurately. It was easier for them to equate "true" with "yes", and "false" with "no", resulting in inaccurate recording of answers for some items. They commented that trying to figure out whether to answer true or false, as opposed to answering yes or no was very confusing for them. While this was not a difficulty in this study because the researcher was present while participants were completing the MMPI-2 to provide assistance, CFS sufferers trying to complete the

MMPI-2 without assistance may have difficulty with some of the items, and record answers inaccurately.

In conclusion, there appears to be a distinct MMPI-2 profile for CFS sufferers that could be used to aid in differential diagnosis between CFS and depression. The MMPI-2 profiles found in this study are similar to those found in previous studies (Miller Iger, 1992), attesting to the validity of the profiles. In addition, it was found that increased fatigue in CFS sufferers was associated with increased health concerns, depression, anxiety, confusion, and social isolation. Thus, as CFS sufferers experience more fatigue, they are also likely to experience an increase in psychological symptoms.

Future Research

Future research that examines MMPI-2 profiles for CFS sufferers should directly compare the profiles of a group of depressed patients with a group of CFS patients to see if there are any significant differences. Studies done to date have compared the MMPI or MMPI-2 profiles of CFS populations to those of normal controls (Stricklin et al., 1990), chronic pain sufferers (Blakely et al., 1991), or to previously established profiles for depression (Iger, 1990; Miller Iger, 1992), but have not directly compared them to the profiles for a group of depressed patients.

Blakely et al. (1991) point out the need to investigate whether personality dimensions and psychological variables associated with CFS remain stable despite remission of symptoms. To this end, future research on the effect of fatigue on MMPI-2 profiles should use a within-subjects repeated measures design to investigate a possible causal relationship. Such a design would also serve to investigate the test-retest reliability of the MMPI-2 with a CFS population.

Finally, it is suggested that future research investigating self-rated severity of fatigue in a CFS population define fatigue very specifically to ensure that all participants are referring to the same types of fatigue. Such studies are limited in that the fatigue measures rely on subjective reports by the participants, rather than objective measures of fatigue. This is necessary with a CFS population because of the nature of the fatigue that they experience. Mental fatigue in CFS sufferers is one of their most prominent symptoms, yet it is extremely difficult, if not impossible to measure objectively. In addition, people with CFS suffer from both mental and physical fatigue which sometimes fluctuate independent of each other. Participants in this study pointed out that on some days they were experiencing relatively low levels of physical fatigue, but high levels of mental fatigue, and would average these two components

and consider themselves moderately fatigued if they had to rate their fatigue severity. For example, on the VAS, participants may be defining fatigue as mental, physical, or a combination of the two. Given that people with CFS experience both mental and physical fatigue, it may be beneficial to use a VAS for both types of fatigue. This would allow for the assessment of both types of fatigue. In addition, "fatigue" should be defined very specifically to decrease some of the subjectivity of the scale.

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APPENDIX A

CDC Diagnostic Criteria For Chronic Fatigue Syndrome (CFS)

A case of the chronic fatigue syndrome must fulfil major criteria 1 and 2, and the following minor criteria: 6 or more of the 11 symptom criteria and 2 or more of the 3 physical criteria; or 8 or more of the 11 symptom criteria.

Major Criteria

1. New onset of persistent or relapsing, debilitating fatigue or easy fatigability in a person who has no previous history of similar symptoms, that does not resolve with bedrest, and that is severe enough to reduce or impair average daily activity below 50% of the patient's premorbid activity level for a period of at least 6 months.
2. Exclude other disease processes.

Minor Criteria

To fulfil a symptom criterion, a symptom must have begun at or after the time of onset of increased fatigability, and must have persisted or recurred over a

period of at least 6 months (individual symptoms may or may not have occurred simultaneously). Symptoms include:

1. Mild fever - oral temperature between 37.5 C and 38.6 C, if measured by the patient-or chills.
2. Sore throat.
3. Painful lymph nodes in the anterior or posterior cervical or axillary distribution.
4. Unexplained generalized muscle weakness.
5. Muscle discomfort or myalgia.
6. Prolonged (24 hours or greater) generalized fatigue after levels (of) exercise that would have easily been tolerated in the patient's premorbid state.
7. Generalized headaches (of a type, severity, or pattern that is different from headaches the patient may have had in the premorbid state).
8. Migratory arthralgia without joint swelling or redness.
9. Neuropsychological complaints (one or more of the following: photophobia, transient visual scotomata, forgetfulness, excessive irritability, confusion,

difficulty thinking, inability to concentrate, depression).

10. Sleep disturbance (hypersomnia or insomnia).
11. Description of the main symptom complex as initially developing over a few hours to a few days.

Physical Criteria

Physical criteria must be documented by a physician on at least two occasions, at least 1 month apart.

1. Low-grade fever - oral temperature between 37.6 C and 38.6 C or rectal temperature between 37.8 C and 38.8 C.
2. Nonexudative pharyngitis.
3. Palpable or tender anterior or posterior cervical or axillary lymph nodes. (Note: lymph nodes greater than 2 cm in diameter suggest other causes. Further evaluation is warranted.)

APPENDIX B

Brief Description of Validity and Basic Scales for the MMPI and MMPI-2

1/ Validity scales

? Cannot Say: the number of items that were not answered. A large number of unanswered items invalidates the results.

L Lie: high scores indicate a socially desirable response tendency; that is, subjects respond the way they think an ideal person would respond.

F Infrequency: high scores can indicate:

i) questions weren't understood

ii) random answering style

iii) exaggeration of distress

K Correction, or Defensiveness: high scores can indicate high defensiveness, and "faking good", while low scores can indicate poor defenses, and "faking bad".

2/ Basic Scales

1 Hypochondriasis: preoccupation with bodily concerns and state of physical health.

2 Depression: sad mood, feelings of discouragement, pessimism, hopelessness, hyper-responsibility, high personal standards, and intrapunitiveness.

3 Hysteria: somatic complaints, and denial of physical health, psychological or emotional problems, and social anxiety.

4 Psychopathic Deviate: negative attitudes towards family and social background, authority problems, and social alienation.

5 Masculinity/Femininity: emotional reactions, interests, attitudes, and feelings about relationships usually associated with members of the opposite sex.

6 Paranoia: interpersonal sensitivity, suspicious attitudes, projected hostility, insecurity, and self-centredness.

7 Psychasthenia: generalized anxiety and distress, high moral standards, self-blame, rigid impulse control, and obsessive personality traits.

8 Schizophrenia: strange beliefs, unusual sensory experiences, confusion, difficulty concentrating, special sensitivities such as emotional and social alienation.

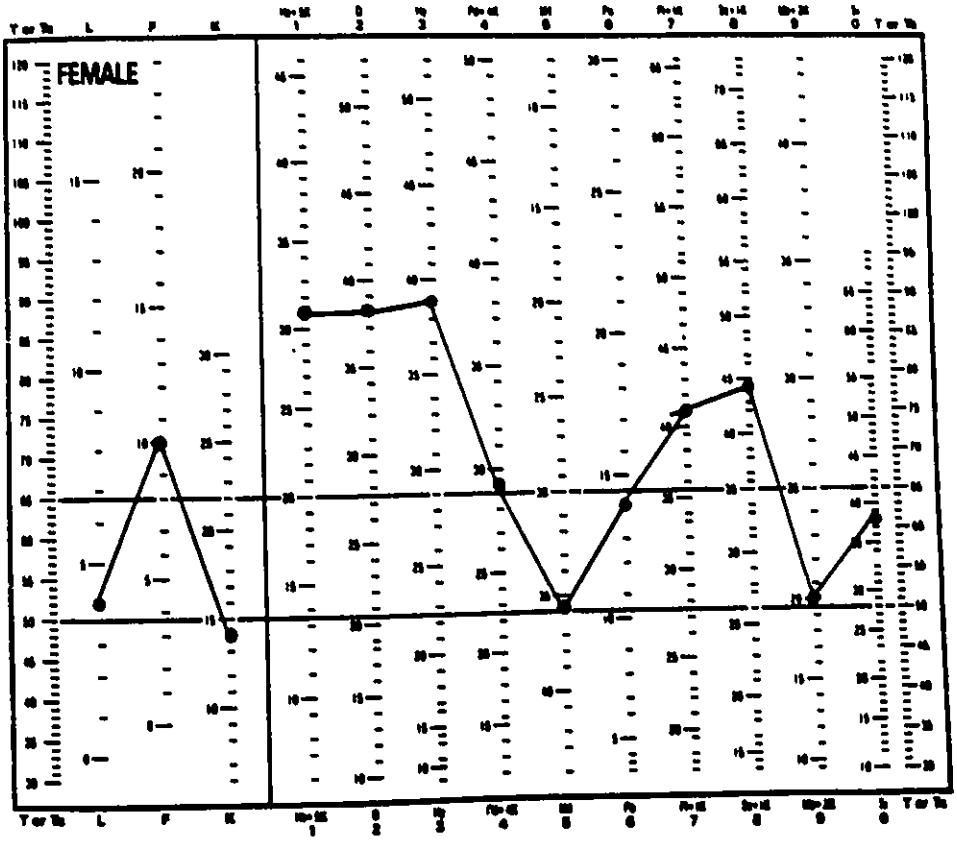
9 Hypomania: overactivity, impulsiveness, overambitiousness, high aspirations, and extroversion.

0 Social Introversion: social shyness, social anxiety, and lack of social assertiveness.

APPENDIX C

AVERAGE MMPI-2 PROFILE FOR FEMALE CFS SUBJECTS

T Score

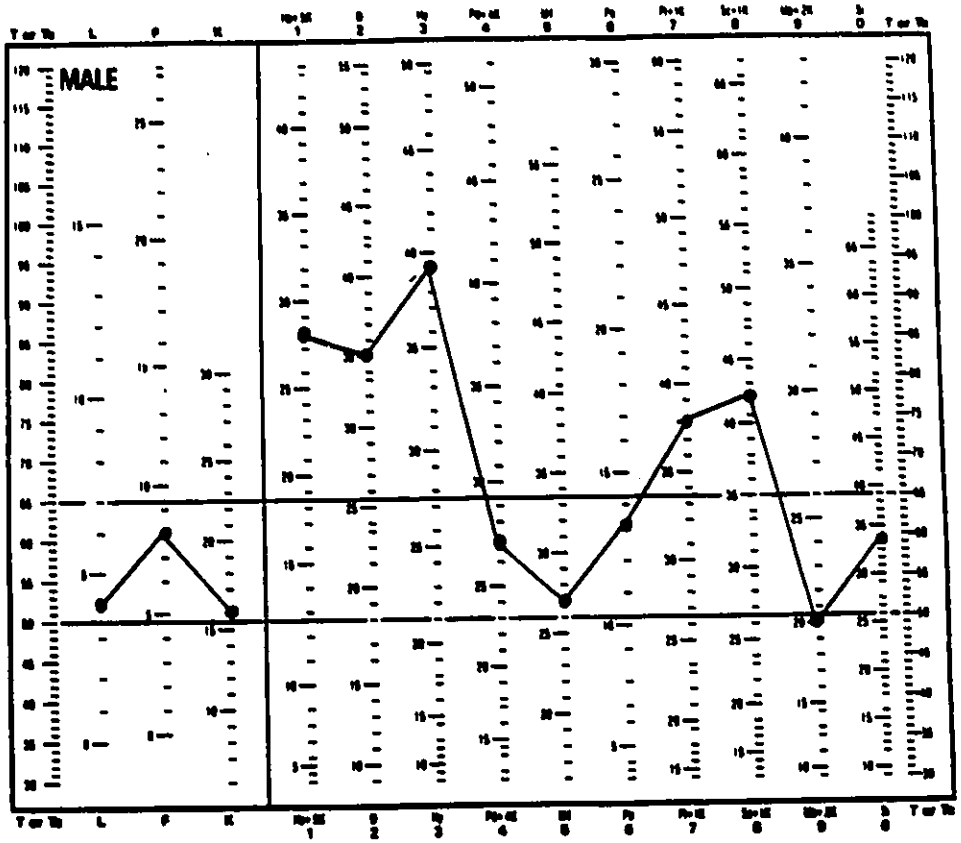


MMPI-2 Scale

Note. The data for the Miller Iger sample is from "The MMPI-2 Chronic Fatigue Syndrome Profile" by L. Miller Iger, 1992, The CFIDS Chronicle, September, available from The CFIDS Association, Inc., PO Box 220398, Charlotte, North Carolina 28222-0398, phone number (800) 442-3437.

AVERAGE MMPI-2 PROFILE FOR MALE CFS SUBJECTS

T Score



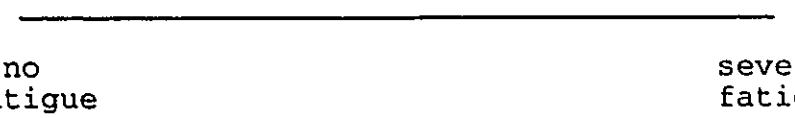
MMPI-2 Scale

Note. The data for the Miller Iger sample is from "The MMPI-2 Chronic Fatigue Syndrome Profile" by L. Miller Iger, 1992, The CFIDS Chronicle, September, available from The CFIDS Association, Inc., PO Box 220398, Charlotte, North Carolina 28222-0398, phone number (800) 442-3437.

Appendix D

Sample Visual Analogue Scale

Please indicate the place on the line which best indicates your current level of fatigue.



no fatigue

severe fatigue

APPENDIX E

The Fatigue Severity Scale

Please choose a number from 1 to 7 that indicates your degree of agreement with each statement. The number 1 indicates "strongly disagree" and 7 indicates "strongly agree".

Statements

1. My motivation is lower when I am fatigued.

1----2----3----4----5----6----7
strongly disagree — strongly agree

2. Exercise brings on my fatigue.

1----2----3----4----5----6----7
strongly disagree — strongly agree

3. I am easily fatigued.

1----2----3----4----5----6----7
strongly disagree — strongly agree

4. Fatigue interferes with my physical functioning.

1----2----3----4----5----6----7
strongly disagree — strongly agree

5. Fatigue causes frequent problems for me.

```
   1----2----3----4----5----6----7
strongly                    strongly
disagree                     agree
```

6. My fatigue prevents sustained physical functioning.

```
   1----2----3----4----5----6----7
strongly                    strongly
disagree                     agree
```

7. Fatigue interferes with carrying out certain duties and responsibilities.

```
   1----2----3----4----5----6----7
strongly                    strongly
disagree                     agree
```

8. Fatigue is among my three most disabling symptoms.

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   1----2----3----4----5----6----7
strongly                    strongly
disagree                     agree
```

9. Fatigue interferes with my work, family, or social life.

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   1----2----3----4----5----6----7
strongly                    strongly
disagree                     agree
```

APPENDIX F

Fatigue Questionnaire

Please read each statement carefully, and score each with a number from 1-7 indicating how it applied to you on average within the past week (including today).

1 - much better than usual

2 - better than usual

3 - slightly better than usual

4 - same as usual

5 - slightly worse than usual

6 - worse than usual

7 - much worse than usual

PHYSICAL FATIGUE

1. I get tired easily.

1----2----3----4----5----6----7

2. I need to rest more.

1----2----3----4----5----6----7

3. I feel sleepy or drowsy.

1----2----3----4----5----6----7

4. I can no longer start anything.

1----2----3----4----5----6----7

5. I am always lacking in energy.

1----2----3----4----5----6----7

6. I have less strength in my muscles.

1----2----3----4----5----6----7

7. I feel weak.

1----2----3----4----5----6----7

8. I can start things without difficulty, but get weak as I go on.

1----2----3----4----5----6----7

MENTAL FATIGUE

1. I have problems concentrating.

1----2----3----4----5----6----7

2. I have problems thinking clearly.

1----2----3----4----5----6----7

3. I make more slips of the tongue, or have problems finding the correct word.

1----2----3----4----5----6----7

4. I have problems with eyestrain.

1----2----3----4----5----6----7

5. I have problems with memory.

1----2----3----4----5----6----7

APPENDIX G

RESEARCH INFORMATION FORM

You are invited to participate in a research investigation being conducted by myself, Janette Collier, under the supervision of Dr. Kathryn Lafreniere of the Psychology Department of the University of Windsor. I am conducting an investigation for my Master's thesis research. This research will examine personality characteristics in patients with Chronic Fatigue Syndrome (CFS), and the potential relationship such characteristics have with severity of fatigue.

My interest in CFS began when both of my parents contracted this disease about 6 years ago; they have been sick ever since. In reading literature on CFS, and in living with my parents, it has come to my attention that CFS patients may have a personality profile as a result of their illness that differs from that of patients with other chronic illnesses. It has been suggested that a personality test be used to help differentiate CFS patients from other patients to prevent the misdiagnosis that often occurs.

This study will involve filling out three short scales which measure severity of fatigue, and a standard personality questionnaire. Questions regarding demographic information such as age, sex, and length of illness will also be asked. Altogether, it is estimated that this should take three hours of your time. If necessary, I would be willing to come to your home and read the questions to you should you find the task tiring.

Your participation in this study is strictly voluntary. If you choose to begin to fill out the questionnaires, you can stop at any time, and you can refrain from answering any question that you do not wish to answer. We would, however, prefer that you fill out as many of the questionnaire items as possible, as a large number of unanswered items may invalidate your questionnaires, and we will not be able to use them. All information gathered in this study is completely confidential. Your name will not appear anywhere on the questionnaires.

If you have any questions about this investigation, the investigator will be happy to answer them at any time. If you are interested in the results of this investigation, you will be given the opportunity to call Dr. Lafreniere at the university by calling (519) 253-4232 ext. 2233, after the study has been completed.

This research investigation has been approved by the Ethics Committee of the Psychology Department , University of Windsor. Any questions or concerns regarding the procedures or ethics of this investigation may be directed to:

Dr. Ron Frisch, Chair
Psychology Dept. Ethics Committee
University of Windsor
(519) 253-4232 ext. 7012.

If you sign this form below on the line, complete the questionnaires, and return them to the investigator, it will be assumed that you have read and understood this information, and that you freely agreed to participate in this research study. Please note that you will be enclosing one copy of this consent form will be placed in a sealed envelope separate from your questionnaires, so there will be no way to identify your questionnaires. The second consent form is for you to keep for your own records.

Please sign here: _____

Date: _____

VITA AUCTORIS

Janette Marie Collier was born on November 27, 1968 in Scarborough, Ontario. In June, 1987 she graduated from Francis Libermann Catholic High School in Scarborough, Ontario. In September, 1987 she enrolled at McMaster University in Hamilton, Ontario. She graduated summa cum laude with a Bachelor of Science Honours degree in Psychology in May, 1991. Since September, 1992 she has been enrolled in the Master's programme in Adult Clinical Psychology at the University of Windsor.